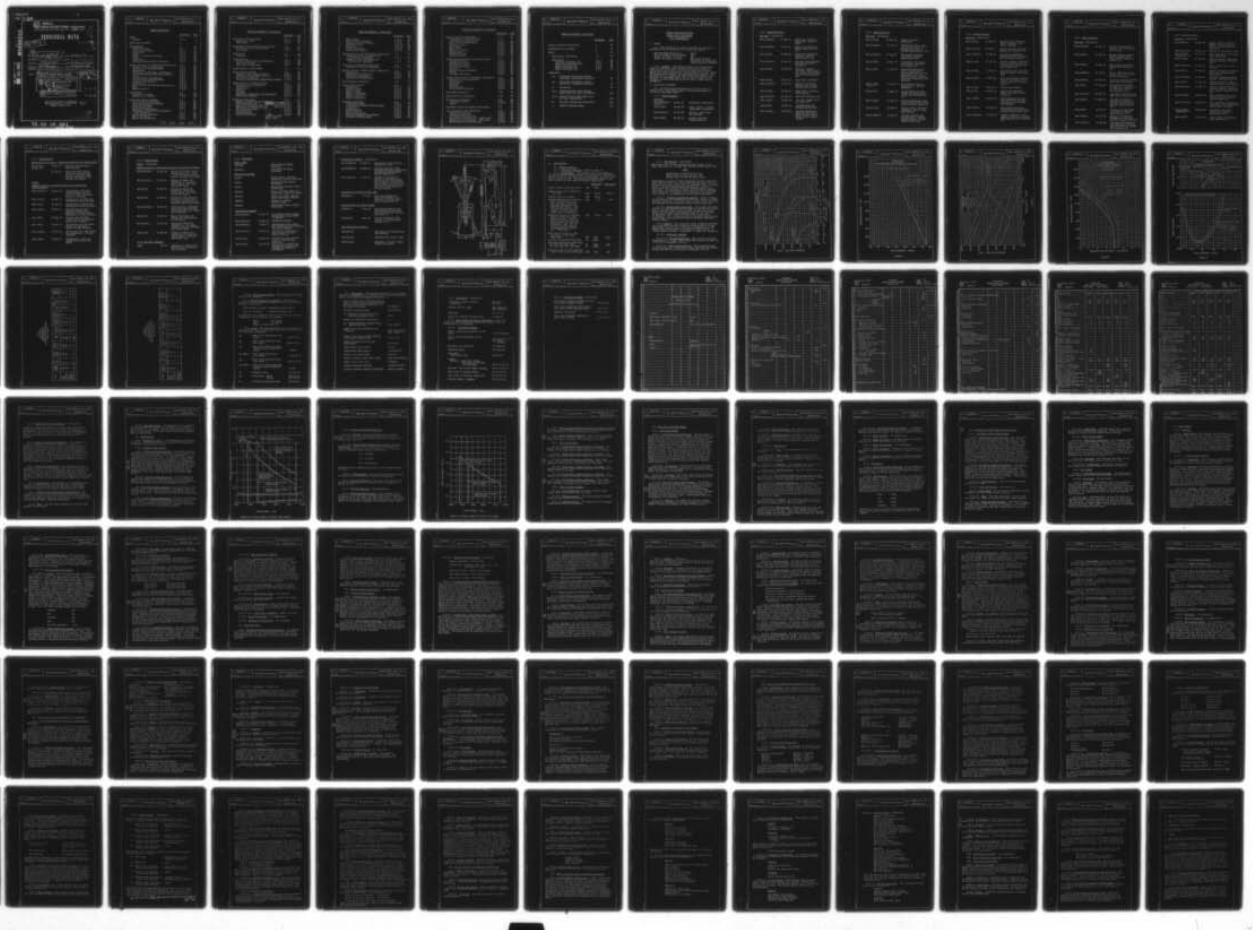
AD-A058 222 BELL HELICOPTER TEXTRON FORT WORTH TEX F/G 1/3
DETAIL SPECIFICATION FOR MODEL AH-1G HELICOPTER FY-71 PROCUREME--ETC(U)
AUG 70 D A HILL DA-23-204-AMC-04075
UNCLASSIFIED BHT-209-947-105 NL

1 OF 2
AD A058222



AVSCOM
TR-70-20

BELL
HELICOPTER COMPANY
POST OFFICE BOX 482 · FORT WORTH, TEXAS 76101 A textron COMPANY

TECHNICAL DATA

(12) 138 p.

LEVEL II

(10) BY David A. Hill DATE 20 August 1970

CHECKED _____ DATE _____

APPROVED [illegible] DATE 20 August 1970

APPROVED E. L. Nuckles DATE 25 August 1970

APPROVED [illegible] DATE _____

MODEL (14) BHT-209-947-105 (11) 28 Aug 70

REPORT NO. 209-947-105 DATE 8-20-70

(6) DETAIL SPECIFICATION FOR
MODEL AH-1G HELICOPTER
FY-71 PROCUREMENT

(15) DA-23-044-AMC-04075

THIS SPECIFICATION SUPERSEDES
SPECIFICATION NO. 209-947-105
DATED 6 APRIL 1970

7842 56976 REV 266

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

DETAIL SPECIFICATION FOR MODEL AH-1G HELICOPTER FY-71 PROCUREMENT

1. SCOPE

1.1 This specification shall establish the design requirements for the Model AH-1G Tactical Helicopter.

Service Model Designation	AH-1G
Bell Helicopter Company Model	209
Number of Places for Crew	Two
Number and Type of Engine	One Model T53-L-13 T53-L-13A, or T53-L-13B (Lycoming Model LTC1K-4)

1.1.1 Mission: The primary mission of this aircraft shall be that of an armed tactical helicopter capable of delivering weapons fire, low altitude high speed flight, search and target acquisition, reconnaissance by fire, multiple weapons fire support and troop helicopter support. The aircraft shall be capable of performing this mission from prepared or unprepared areas, day or night flying and to navigate by dead reckoning or by the use of radio aids to navigation.

2. APPLICABLE DOCUMENTS

2.1 The following publications with issue dates as listed below, shall form a part of this specification to the extent specified herein.

2.1.1 Specifications:

Military

MIL-C-5015D(6) Notice 1	25 Oct 67	Connectors, Electrical
MIL-L-5057D	25 Mar 58	Light, Panel, Aircraft, Individual Instruments
MIL-B-5087A(1)	29 Jan 58	Bonding, Electrical, for Aircraft
MIL-W-5088C	26 May 65	Wiring, Aircraft, Installation of

2.1.1 Specifications:

Military (Continued)

MIL-A-5090B(1)	15 Mar 55	Adhesives; Airframe Structural, Metal to Metal
MIL-P-5238A(2)	31 Jan 57	Pumps; Fuel Booster, General Specification for
MIL-E-5400L	01 Aug 69	Electronic Equipment, Airborne, General Specification for
MIL-T-5422E(2)	15 Nov 61	Testing, Environmental, Aircraft Electronic Equipment
MIL-H-5440D	10 May 63	Hydraulic Systems; Aircraft, Types I and II, Design Installation and Data Requirements for
MIL-R-5520B	19 Sep 57	Reservoirs; Hydraulic
MIL-G-5572C(1)	30 Jun 60	Gasoline, Aviation Grades 80/87, 91/96, 100/130 and 115/145
MIL-T-5578C	13 Jan 65	Tank, Fuel, Aircraft, Self-Sealing
MIL-T-5579(1)	14 Jun 56	Tank Self-Sealing, Oil
MIL-J-5624E	23 Mar 60	Jet Fuel, Grades JP-3, JP-4 and JP-5
MIL-S-5659	28 Apr 50	Soundproofing and Insulating Materials
MIL-L-5667B	04 Feb 64	Lighting Equipment, Aircraft Instrument Panel General Specification for Installation

2.1.1 Specifications:

Military (Continued)

MIL-C-5778B	01 Dec 58	Covers, Aircraft Components
MIL-T-5842A(1)	13 Jul 53	Transparent Areas, Anticing, Defrosting and Defogging Systems - General Specification for
MIL-T-5955A(1)	16 Aug 57	Transmission Systems Helicopter, General Requirements for
MIL-I-5997B	10 May 63	Instruments and Instrument Panels, Aircraft, Installation of
MIL-E-6051C	17 Jun 60	Electrical-Electronic System Compatibility and Interference Control Requirement for Aeronautical Weapon Systems, Associated Subsystems and Aircraft
MIL-I-6181D Notice 3	22 Jun 65	Interference Control Requirements, Aircraft Equipment
MIL-S-6144	21 Apr 50	Soundproofing for Aircraft; General Specification for Installation of
MIL-L-6503C	13 May 58	Lighting Equipment, Aircraft, General Specification for Installation of
MIL-C-6781B	13 Sep 60	Control Panel, Aircraft Equipment, Rack or Console Mounted
MIL-P-6997B(1)	11 Feb 58	Plastic; Working and Installation of Transparent Sheets, General Specification for

2.1.1 Specifications:

Military (Continued)

MIL-E-7016A	14 Dec 54	Electric Load and Power Source Capacity, Aircraft, Analysis
MIL-E-7017(1)	28 Feb 61	Electrical Load Analysis Method for Aircraft, DC
MIL-E-7080A(1)	05 Sep 56	Electrical Equipment; Installation of Aircraft, General Specification
MIL-A-7772B	27 Jun 56	Antenna Systems, Airborne, General Specification for the Design, Location and Installation of
MIL-L-7808G	22 Dec 67	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-F-7872C	18 Nov 66	Fire and Overheat Warning System, Continuous, Aircraft: Test and Installation of
MIL-T-7935A	20 Jun 56	Towing Requirements
MIL-G-7940	29 May 52	Gages, Fuel Quantity, Capacitor Type, Installation of
MIL-I-8500B	10 Oct 60	Interchangeability and Replaceability of Component Parts for Aircraft and Missiles
MIL-H-8501A	07 Sep 61	Helicopter Flying and Ground Handling Qualities, General Requirements for
MIL-S-8512B(1)	04 Feb 59	Support Equipment, Aeronautical, Special, General Requirements for the Design of

2.1.1 Specifications:

Military (Continued)

MIL-V-8608(2)	19 Apr 57	Valves; Fuel Shut-Off Electric Motor Operated, 28 Volt, DC
MIL-M-8609A	19 Jul 57	Motors, Direct Current, 28 Volt System, Aircraft General Specification for
MIL-F-8615B	25 Mar 64	Fuel System Components; General Specification for
MIL-D-8634B(3)	16 Jun 67	Decal, Elastomeric Pigmented Film, for Use on Exterior Surfaces
MIL-S-8698(1)	28 Feb 58	Structural Design Requirements for Helicopters
MIL-I-8700	27 Aug 54	Installation and Test of Electronic Equipment in Aircraft, General Specification for
MIL-J-8711(3)	31 Jul 57	Jack Pads; Aircraft, Design and Installation of
MIL-S-8805C	07 Mar 69	Switches and Switch Assemblies, Sensitive, and push (Snap Action), General Specification for
MIL-A-8806	25 Oct 56	Acoustical Noise Level in Aircraft, General Specification for
MIL-D-9402A	21 Jan 59	Design of Electrical Equipment in Aircraft, General Specification for
MIL-A-9410(1)	18 Jun 54	Antennas, FM Communication Equipment, General Specification for Design and Placement of

2.1.1 Specifications:

Military (Continued)

MIL-F-9490(1)	29 Apr 55	Flight, Control Systems, Design, Installation and Test of, General Requirements for
MIL-M-13231A(2)	09 May 60	Marking of Electronic Items
MIL-W-16878D Supplement 1A	05 Jul 61	Wire, Electrical Insulated, High Temperature
MIL-L-23699A	04 Feb 66	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-V-25023(3)	29 Mar 56	Valve, Fuel Drain, Self-Locking
MIL-W-25140	31 Mar 55	Weight and Balance Control Data (for Airplanes and Rotorcraft)
MIL-A-25165A(1)	07 Mar 61	Aircraft Emergency Escape System, Identification of
MIL-A-25463	14 Jan 58	Adhesive Metallic Structural Sandwich Construction
MIL-C-25478(1)	14 Feb 57	Coolers, Lubricating Oil, Aircraft Engine, Synthetic Oil, General Specification for
MIL-E-25499A	06 May 59	Electrical Systems, Aircraft Design of, General Specification for
MIL-H-25579(2)	19 Mar 59	Hose Assembly, Tetrafluoroethylene, High Temperature, Power Plant, Aircraft
MIL-C-26482E Supplement 1	29 May 69	Connectors, Electric, Circular, Miniature, Quick Disconnect
MIL-S-46099	29 Jul 65	Steel Armor, Roll-Bonded, Dual Hardness (U)

2.1.1 Specifications:

Military (Continued)

MIL-A-46103	04 Oct 65	Armor: Lightweight, Ceramic-Faced Composite, Procedure Requirements
MIL-L-58085	23 Jul 65	Light, Beacon, Anti-Collision Aircraft

Bell Helicopter Company

204-060-200	Procurement Specification for a Starter-Generator
204-076-003	Procurement Specification for a Dual Hydraulic Servo Cylinder
204-076-006	Procurement Specification for a Hydraulic Variable Delivery Pump
204-076-053	Procurement Specification for a Hydraulic Servo Cylinder
204-947-002	Finish Specification; Helicopter: Bell Models 204, 205, 209 and 212; Military UH-1 and AH-1 Series
205-075-388	Procurement Specification for RPM Limit Detector
205-076-034	Procurement Specification for a Hydraulic Filter Assembly
209-060-602	Procurement Specification for Gage, Liquid Quantity Capacitor Type, Transistorized
209-060-651	Procurement Specification for a Closed Circuit Refueling Nozzle and Receiver Set
209-060-652	Procurement Specification for Self Sealing, Crashworthy Fuel Tanks
209-071-081	Procurement Specification for Smoke Grenade Dispenser
570-947-001	Detail Specification for BHC Model 570 Stability Augmentation System

2.1.2 Standards:

Military

MIL-STD-143	14 May 63	Specification and Standards, Order of Precedence for the Selection of

2.1.2 Standards:

Military (Continued)

MIL-STD-250B	07 May 64	Cockpit Controls, Location and Actuation of, for Helicopters
MIL-STD-411	31 May 57	Aircrew Stations Visual Signals
MIL-STD-704	06 Oct 59	Electric Power, Aircraft Characteristics and Utilization of
MIL-STD-765	03 Apr 62	Compass Swinging, Aircraft, General Requirements for
MIL-STD-832	03 Jun 63	Preparation of Detail Specification for Aircraft
MIL-STD-838	27 Feb 64	Lubrication of Military Equipment

2.1.3 Publications:

TM 55-6600-200-20	08 Jul 63	Marking of Instruments and Interpretation of Markings
ANC-2		Ground Loads Requirements
Technical Report EP-150	Jun 61	Anthropometry of Army Aviators, Quartermaster Research and Engineering Command

Lycoming Division of AVCO Manufacturing Corporation

Specification No. 104.33 dated 30 September 1964, revised 30 July 1965, 6 May 1966, 30 September 1969 - Lycoming Division of AVCO Manufacturing Corporation, covering T53-L-13/T53-L-13A/T53-L-13B Shaft Turbine Engine.

2.1.3 Publications:

Department of the Army - Technical Bulletin and Regulations:

TB 746-93-2 Change No. 1	02 Nov 67	Painting and Marking of Army Aircraft
	24 Jul 70	Draft Technical Characteristics Armament Subsystem, Helicopter 40MM Grenade Launcher/7.62MM Machine Gun XM28E1

Others

USAECOM Avionics Laboratory Technical Instructions (Installation):

SCL-I-0004C(1)	06 Mar 68	Installation of Control Intercommunication Set C-1611( )/AIC, Interphone System in Aircraft
SCL-I-0019B	01 Apr 65	Installation of Radio Set AN/ARC-54 in Army Aircraft
SCL-I-0020	20 Apr 64	Installation of Radio Set AN/ARC-51X in Army Aircraft
SCL-I-0026B	08 Feb 67	Installation of Gyro-Magnetic Compass Set AN/ASN-43 and Associated Components in Army Aircraft
SCL-I-0034	23 Sep 65	Avionics Installation Instructions for Direction Finder Set AN/ARN-83
SCL-I-0051	31 May 67	Installation of the Transponder Set AN/APX-72 System in Army Aircraft
SCL-I-0053A	27 Oct 66	Installation of (VHF) Radio Set AN/ARC-134( ) in Army Aircraft
SCL-I-0055	07 Sep 67	Installation, Radio Set AN/ARC-131 in Army Aircraft

2.1.3 Publications:

Others (Continued)

USAECOM Avionics Laboratory Technical Instructions (Test):

SCL-T-0004C(1)	02 Apr 68	Testing of Control Intercommunication Set C-1611 ( )/AIC Interphone System, Bench, Preflight and Flight
SCL-T-0019B(2)	16 Dec 65	Testing of Radio Set AN/ARC-54 for Army Aircraft, Bench, Preflight and Flight Tests
SCL-T-0020	20 Apr 64	Testing of Radio Set AN/ARC-51( )X for Aircraft; Bench, Preflight and Flight Tests
SCL-T-0026	01 Sep 64	Testing of Gyro Magnetic Compass Set AN/ASN-43( ) for Army Aircraft, Bench Preflight and Flight Tests
SCL-T-0034B(1)	20 Dec 66	Avionics Bench, Preflight and Flight Test Instructions for Direction Finder Set AN/ARN-83
SCL-T-0051	26 Jul 67	Bench, Preflight and Flight Test Instructions for AN/APX-72
SCL-T-0053A	27 Oct 66	Testing of Radio Set AN/ARC-134( ) for Army Aircraft; Bench, Preflight and Flight Tests
SCL-T-0055	07 Sep 67	Testing of Radio Set, AN/ARC-131 for Army Aircraft, Bench, Preflight and Flight Test

U. S. Air Force Handbook

HIAD	Jul 55	Handbook of Instructions for Aircraft Designers, Tenth Edition

2.1.4 Drawings:

Army - Navy

AND20001		Drive-Type XI Engine Accessory
AND20005		Drive-Type XV Engine Accessory

Military Standards

AN3025		Cutout Relay, Aircraft Generator, 28 Volt DC System
AN3117		Receptacle-Fuel Nozzle Grounding
AN2552		Receptacle, External Power, 28 Volts DC
MS24183		Relay, 200 Amp, SPST, Normally Open, Class A8, Sealed
MS25182		Connector, Plug, Electric Quick Disconnect, Battery
MS28027		Indicator, Course, ID-250( )/ARN
MS33575		Dimensions, Basic, Cockpit Helicopter

Electronics Command

ES-C-171380-B	22 Oct 59	Installation Data Antenna and Mounting Plate AT-884 ( )/APX-44
ES-C-200323-E	20 Apr 70	Connection Diagram
ES-D-199084-F	9 Feb 70	Installation Data, Radio Set, AN/ARC-134 Interconnecting Wiring Diagram
ES-D-201221-F	19 Dec 69	Installation Drawing for Discriminator Discrete Signal MD-736/A
ES-D-210304	19 Dec 69	Installation Data Control C-8157( )/ARC Outline Dimension
ES-D-217493	19 Jun 68	Installation Information Transponder Computer Kit 1A/TSEC and Vibration MT-3949A/U

Electronics Command (Continued)

ES-F-199850-B	19 Apr 67	Installation Data Outline Dimensions KY-28
ES-F-200364-F	20 Mar 69	Installation Data Voice Security Equipment TSEC/KY-28 and Mounting MT-3802/ARC Outline Dimensions
ES-J-187150-C	17 Jun 68	AN/APX-72 Transponder System Installation Data, RT-859/APX-72, C-6280A(P)/ APX, SA-1474A, TS-1843/APX, KIT-1A/TSEC, AT-884/APX-44, AT-741/A Interconnecting Wiring Diagram

Department of Defense (DOD) AIMS

X66D1500-D	7 Jun 68	Receiver-Transmitter, Radio RT-859/APX-72 on Hard Mount MT-3809/APX-72 Outline Dimensions of

United States Air Force (USAF)

X64C927-G	4 Apr 66	Test Set-Transponder Set TS-1843/APX and Mounting Plate MT-3513/APX, Outline Dimensions of
X65C1689-B	6 Dec 65	Control-Transponder Set C-6280( )(P)/APX Outline Dimensions of

Bell Helicopter Company

209-060-653	Fuel Crossover Crashworthy, Self-Sealing
209-070-403	Environmental Control Unit
209-075-228	Regulator, Voltage, Direct Current Generator

BY 8-20-70

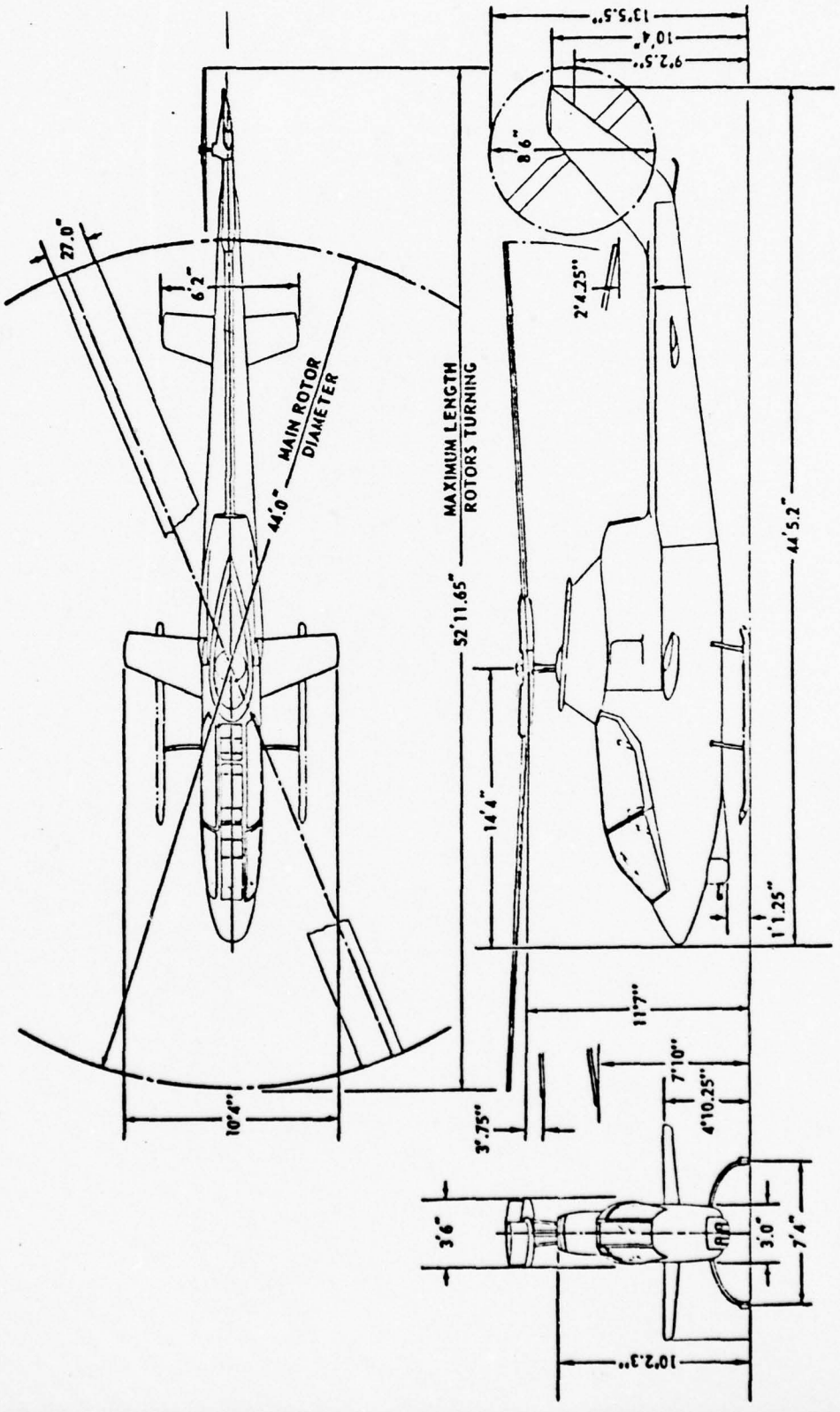
CHECKED

BELL HELICOPTER COMPANY

POST OFFICE BOX 482 • FORT WORTH 1 TEXAS

MODEL AH-1G PAGE 13

RPT 209-947-105



Three-view drawing - AH-1G

7672 55426

3. REQUIREMENTS

3.1 Characteristics:

3.1.1 Three-View Drawing: Refer to page 12.

3.1.2 Performance: The aircraft shall be capable of the following performance under ICAO standard air conditions (unless otherwise specified) at a gross weight of 8000 pounds and an aft cg of 201. The installed armament shall be the XM-28 turret and two LAU3A/A 19-round rocket pods.

		Estimated*	Guaranteed
Engine rating (1100 shp Limit)	shp	1100	
Speed at sea level (6600 rpm) (1100 shp)	kts	149.0	144.0
Maximum redline airspeed	kts	190.0	
Maximum endurance at sea level with 1600 pounds of fuel. Fuel includes 10 percent reserve plus warm-up and take-off allowance. Does not include 5 percent increase in engine specification sfc. (6600 rpm)	hrs	3.3	3.0
Operating radius at cruising speed at sea level 1600 pounds of fuel. Fuel includes 10 percent reserve plus warm-up and take-off allowance. Does not include 5 percent increase in engine specification sfc. (6600 rpm)	nmi	155.0	148.0
Best rate of climb at 1100 shp limit at sea level (6600 rpm)	fpm	2125	1800
Service ceiling NRP (6600 rpm)	ft	18200	-
Hovering ceiling OGE (6600 rpm)			
(a) with 95°F OAT (MRP)	ft	2600	2000
(b) with ICAO Std. OAT (MRP)	ft	9500	
Vertical rate of climb 1100 shp Limit at sea level (6600 rpm)	fpm	940	500

7872 55426

3.1.2 Performance: (Continued)

*Based upon "Preliminary Engineering Test Report of the Bell Huey Cobra, U. S. Army Test Activity dated March 1966."

NOTE

Performance is predicated on the XM-28 turret having the same aerodynamic drag as the TAT-102A turret.

Performance is based on power available and fuel flow from Model specification No. 104.33 dated 30 September 1964, revised 30 July 1965, 6 May 1966, 30 September 1969 - Lycoming Division of AVCO Manufacturing Corporation, covering T53-L-13/T53-L-13A/T53-L-13B Shaft Turbine Engine, using JP-4 fuel. All performance items are without the GFAE particle separator or foreign object damage screen installed and without the environmental control system operating.

3.1.2.1 Estimated Performance Curves: Refer to pages 15 through 21. All performance curves are without the GFAE particle separator or foreign object damage screen installed and without the environmental control system operating.

3.1.2.2 Engine Performance Data: The engine data which applies to this aircraft, as provided by the engine manufacturer's specification, will be found on pages 22 and 23. These data are taken from Specification No. 104.33 dated 30 September 1964, revised 30 July 1965, 6 May 1966, 30 September 1969 - Lycoming Division of AVCO Manufacturing Corporation, covering T53-L-13/T53-L-13A/T53-L-13B Shaft Turbine Engine.

3.1.3 Weight: The contractor shall establish and maintain a suitable system to provide a high degree of weight and balance control and to facilitate preparation of the weight and balance data as specified in MIL-W-25140. A "Group Weight Statement" is provided on pages 28 through 32.

3.1.3.1 Alternate Loading:

3.1.3.1.1 Hog Configurations: The alternate Hog Configurations No. 1 and 2 shall weigh 9500 pounds and shall be as listed in paragraph 3.18.7.1.

3.1.3.1.2 Scout Configurations: The alternate Scout Configurations No. 1 and 2 shall weigh 9460 and 9500 respectively and shall be as listed in paragraph 3.18.7.2.

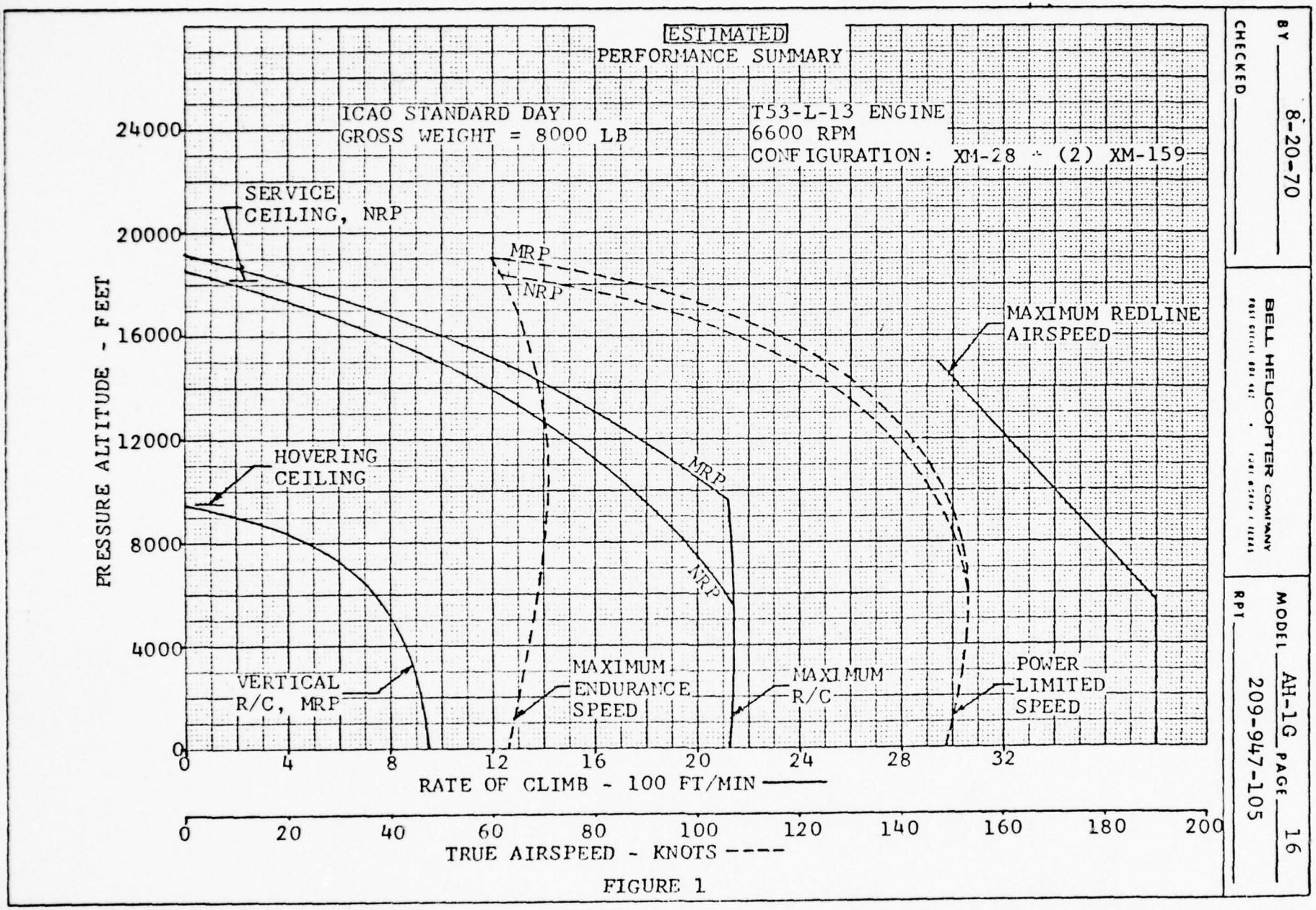


FIGURE 1

BY 8-20-70
CHECKED

BELL HELICOPTER COMPANY
FORT WORTH, TEXAS

MODEL AH-1G PAGE 16
RPT 209-947-105

ESTIMATED
MAXIMUM REDLINE AIRSPEED VS ALTITUDE

ICAO STANDARD DAY

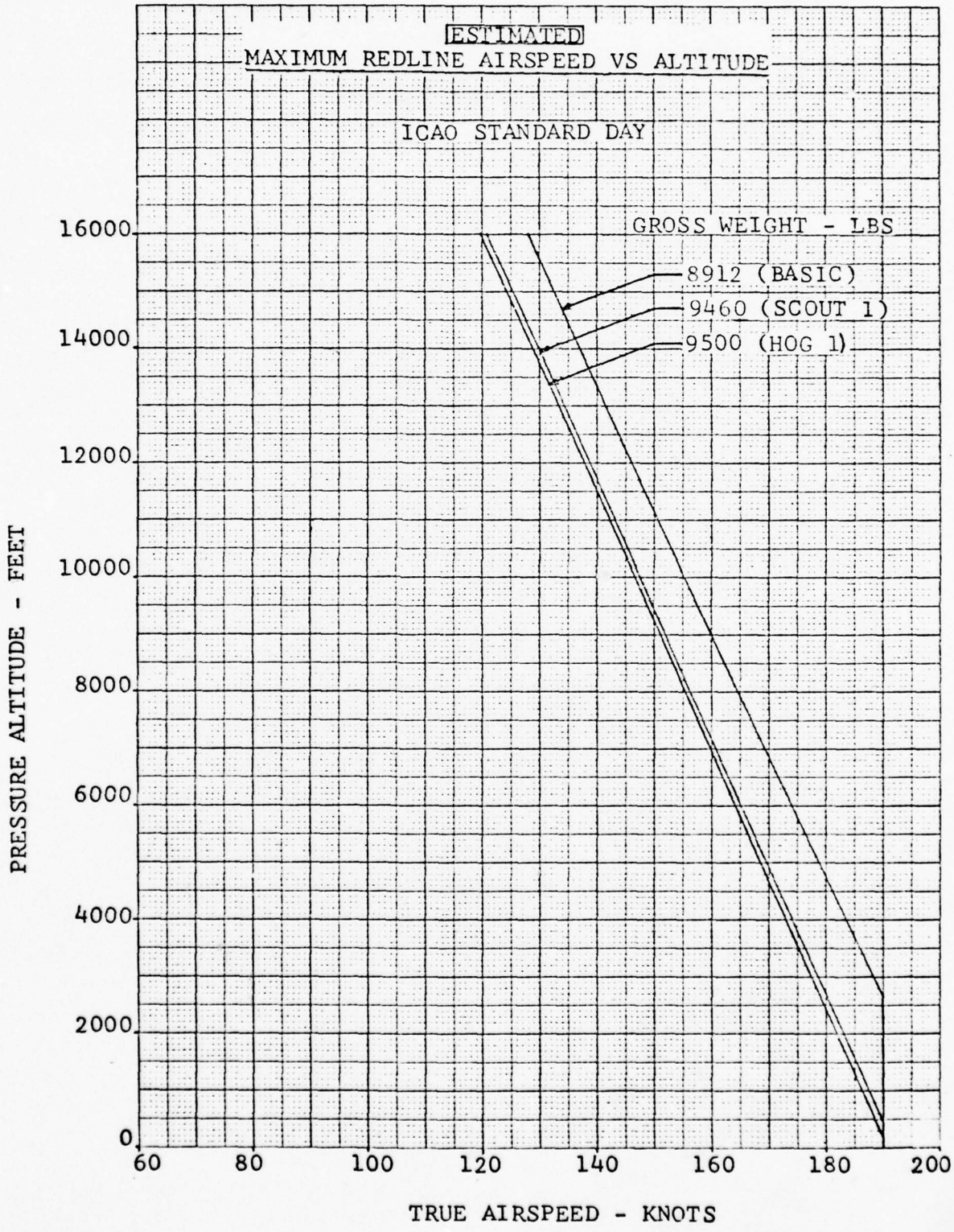


FIGURE 2

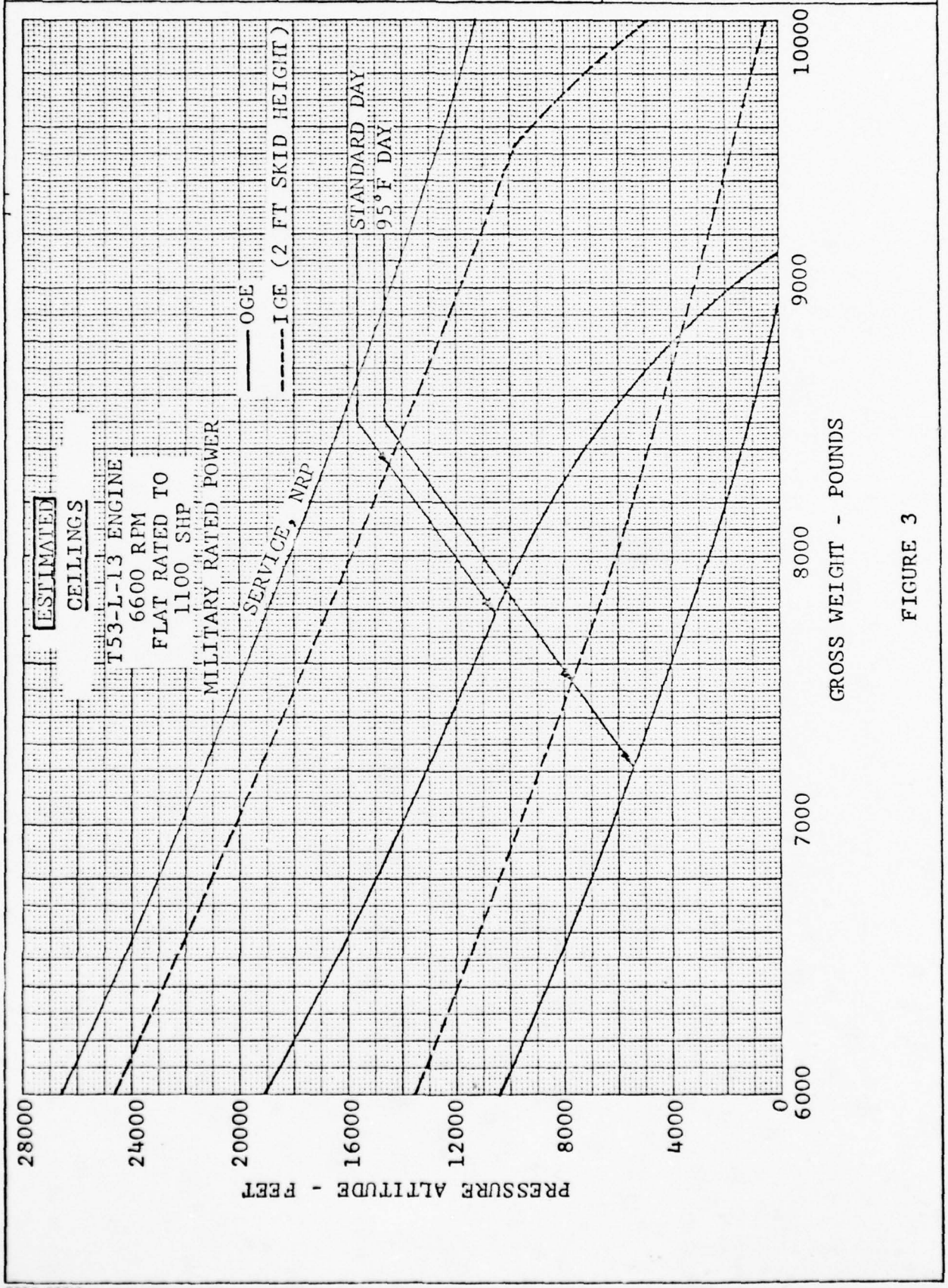

ESTIMATED CEILINGS
T53-L-13 ENGINE
6600 RPM
FLAT RATED TO
1100 SHP
MILITARY RATED POWER
OGE
IGE (2 FT SKID HEIGHT)
STANDARD DAY
95°F DAY
SERVICE, NRP
PRESSURE ALTITUDE - FEET
28000
24000
20000
16000
12000
8000
4000
0
6000
7000
8000
9000
10000
GROSS WEIGHT - POUNDS

FIGURE 3

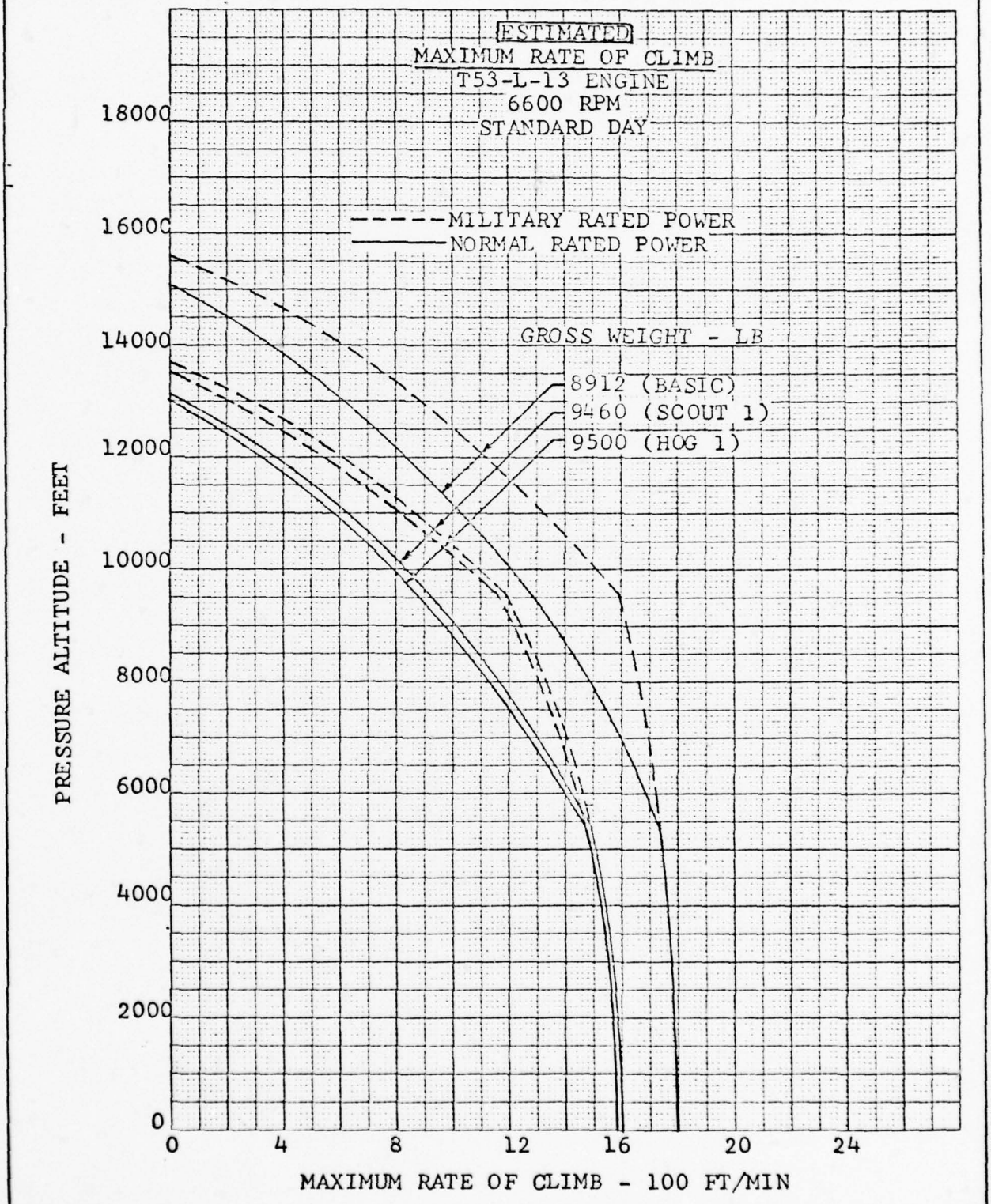

ESTIMATED
MAXIMUM RATE OF CLIMB
T53-L-13 ENGINE
6600 RPM
STANDARD DAY
MILITARY RATED POWER
NORMAL RATED POWER
GROSS WEIGHT - LB
8912 (BASIC)
9460 (SCOUT 1)
9500 (HOG 1)
PRESSURE ALTITUDE - FEET
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
0
4
8
12
16
20
24
MAXIMUM RATE OF CLIMB - 100 FT/MIN

FIGURE 4

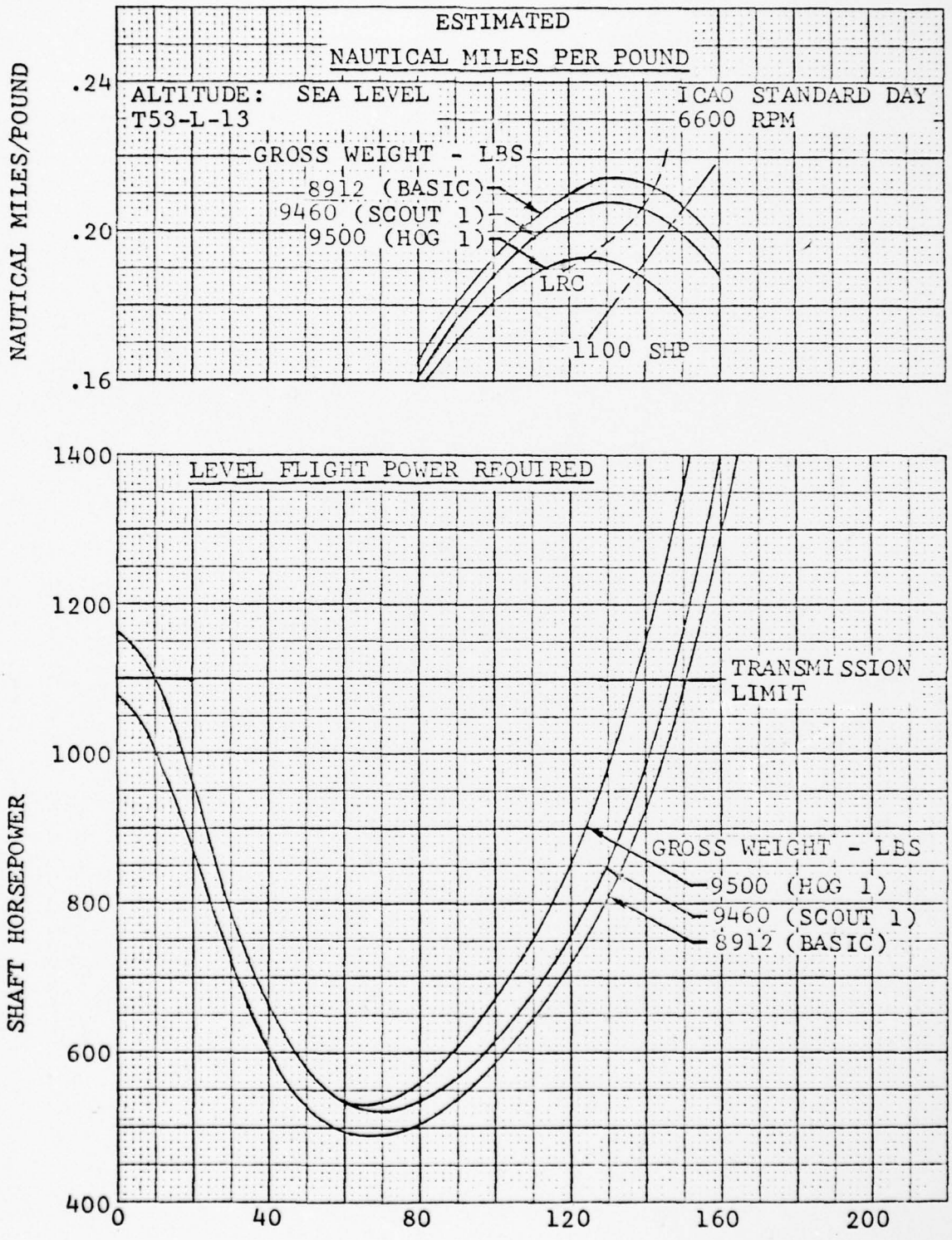

ESTIMATED
NAUTICAL MILES PER POUND
ALTITUDE: SEA LEVEL
T53-L-13
ICAO STANDARD DAY
6600 RPM
GROSS WEIGHT - LBS
8912 (BASIC)
9460 (SCOUT 1)
9500 (HOG 1)
LRC
1100 SHP
NAUTICAL MILES/POUND
.24
.20
.16
LEVEL FLIGHT POWER REQUIRED
TRANSMISSION LIMIT
GROSS WEIGHT - LBS
9500 (HOG 1)
9460 (SCOUT 1)
8912 (BASIC)
SHAFT HORSEPOWER
1400
1200
1000
800
600
400
0
40
80
120
160
200
TRUE AIRSPEED - KNOTS

FIGURE 5

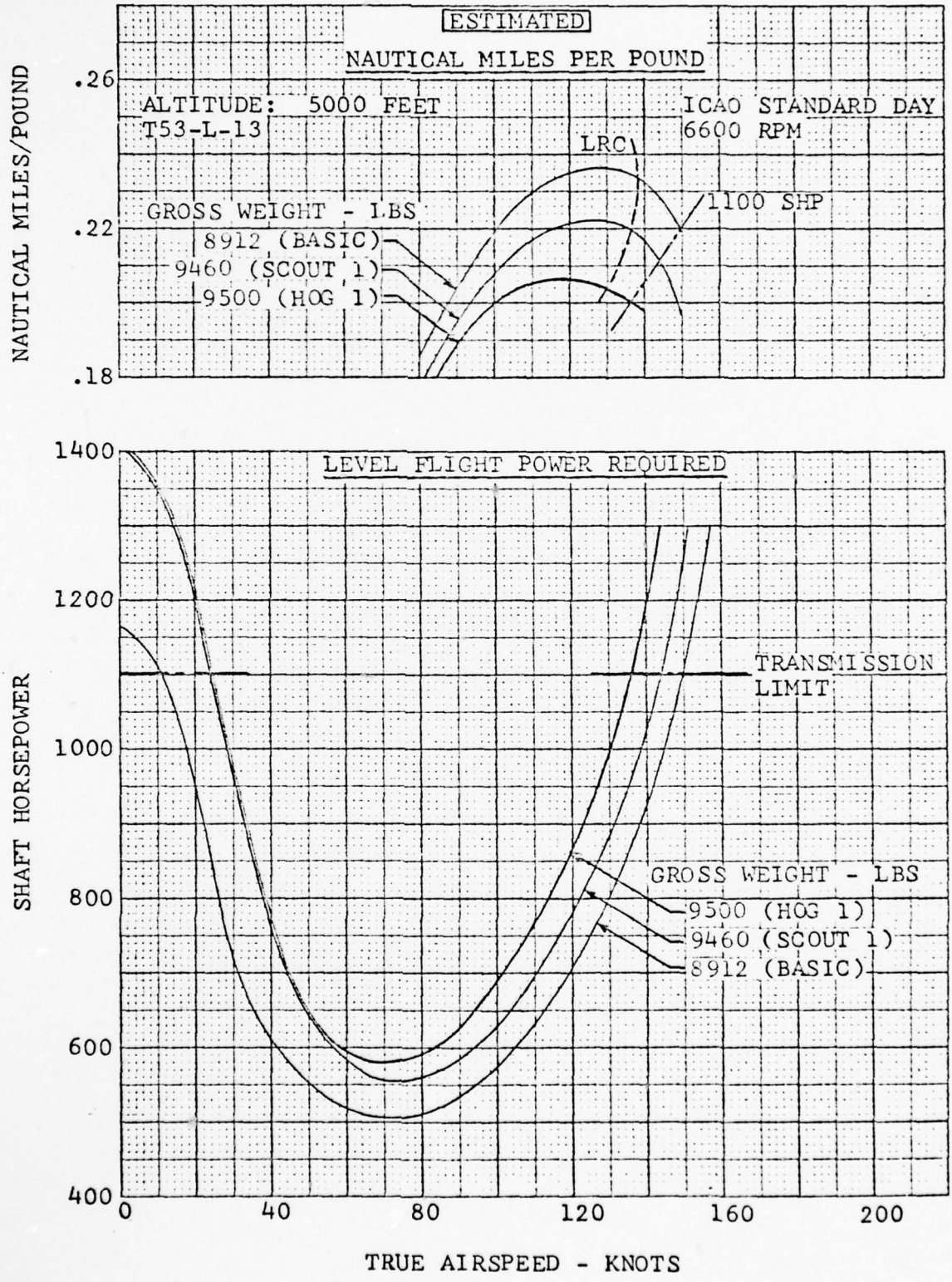

ESTIMATED
NAUTICAL MILES PER POUND
ALTITUDE: 5000 FEET
T53-L-13
ICAO STANDARD DAY
6600 RPM
LRC
1100 SHP
GROSS WEIGHT - LBS
8912 (BASIC)
9460 (SCOUT 1)
9500 (HOG 1)
NAUTICAL MILES/POUND
.26
.22
.18
LEVEL FLIGHT POWER REQUIRED
TRANSMISSION LIMIT
GROSS WEIGHT - LBS
9500 (HOG 1)
9460 (SCOUT 1)
8912 (BASIC)
SHAFT HORSEPOWER
1400
1200
1000
800
600
400
0
40
80
120
160
200
TRUE AIRSPEED - KNOTS

FIGURE 6

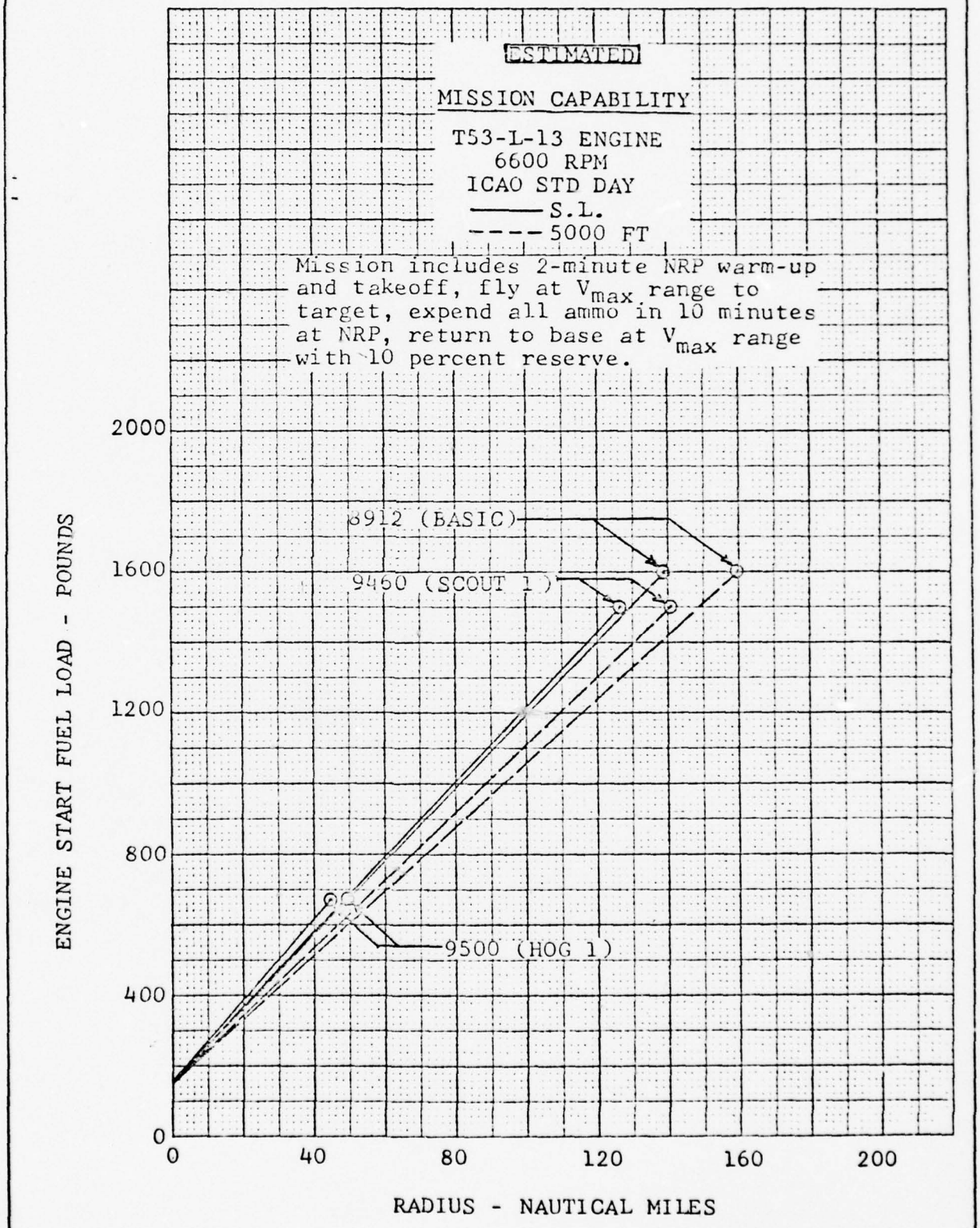

ESTIMATED
MISSION CAPABILITY
T53-L-13 ENGINE
6600 RPM
ICAO STD DAY
S.L.
5000 FT
Mission includes 2-minute NRP warm-up and takeoff, fly at Vmax range to target, expend all ammo in 10 minutes at NRP, return to base at Vmax range with 10 percent reserve.
8912 (BASIC)
9460 (SCOUT 1)
9500 (HOG 1)
ENGINE START FUEL LOAD - POUNDS
2000
1600
1200
800
400
0
0
40
80
120
160
200
RADIUS - NAUTICAL MILES

FIGURE 7

TABLE I

T53-L-13 ENGINE

(Lycoming Model LTC1K-4)

PERFORMANCE RATINGS AT

STANDARD SEA LEVEL STATIC CONDITIONS

(203 sq. in. exhaust area)

Ratings	Shaft Horsepower (minimum) SHP	Net Jet Thrust lb. (minimum) F_n	Equivalent Shaft Horsepower (minimum) ESHP	Gas Producer Rotor Speed RPM (maximum) **	Output Shaft RPM	Specific Fuel Consumption lb/SHP/hr (maximum)	Equivalent Specific Fuel Consumption lb/ESHP/hr (maximum)	Rated Gas Producer Turb. Inlet Temp. °F (maximum)	Maximum Allowable		Measured Rated Exhaust Gas Temp. °F (maximum)
									Power SHP	Torque lb-ft.	
Military	1400	126	1450	25,400	6300	0.580	0.560	1720	1485	1175	1150
Normal	1250	115	1296	24,750	6040	0.600	0.578	1660	1300	1110	1120
90% Normal	1125	106	1167	24,250	5810	0.620	0.596	----	1300	1110	----
75% Normal	938	92	975	23,475	5440	0.663	0.636	----	1300	1110	----
Flight Autorotation* (No Load)	0	----	----	17,100	6650 max	220 lb/hr	220 lb/hr	----	----	----	800 ± 100
Ground Idle *	40 max	8 max	43 max	13,100	0-6650 range	150 lb/hr	150 lb/hr	----	----	----	900 ± 100

TABLE I-A

T53-L-13 ENGINE

(Lycoming Model LTC1K-4)

ALTITUDE PERFORMANCE RATINGS

6,000 ft., 95°F. Ambient Temperature, V = 0

(203 sq. in. exhaust area)

Ratings	Shaft Horsepower (minimum)	Net Jet Thrust lb. (minimum)	Equivalent Shaft Horsepower (minimum)	Gas Producer Rotor Speed RPM (maximum)	Output Shaft RPM	Specific Fuel Consumption lb/SHP/hr (maximum)	Equivalent Specific Fuel Consumption lb/ESHP/hr (maximum)	Rated Gas Producer Turb. Inlet Temp. °F (maximum)	Measured Rated Exhaust Gas Temp. °F (maximum)
Military	922	84	956	25,130	6000	0.632	0.610	1730	1185
Normal	816	76	846	24,480	5720	0.661	0.638	1670	1155
90% Normal	734	70	762	23,980	5510	0.690	0.665	----	----
75% Normal	612	62	637	23,250	5120	0.740	0.711	----	----
Flight Autorotation (No Load)	0	----	----	16,830	6650 (max)	160 lb/hr	160 lb/hr	----	----

3.1.3.2 Design Gross Weight: The design gross weight shall be 6600 pounds.

3.1.4 Center of Gravity Locations: The center of gravity limits for internal loading of the helicopter are estimated as follows:

Most forward cg limit = Fuselage Station 190.0

Most aft cg limit = Fuselage Station 201.0

In addition, the estimated lateral cg limits for external loading of the aircraft are as follows:

Right	2.0 inches
Left	2.0 inches
Taken at Water Line 70	

3.1.5 Areas: The principal areas are calculated to be as follows (The following information is not to be used for inspection purposes):

A_b	= Main rotor blade area (one blade)	49.5 sq ft
A_g	= Main rotor geometric disc area total	1520.4 sq ft
σ_g	= Main rotor blade geometric solidity ratio (area/disc area)	0.0650
A_b (Tail)	= Tail rotor blade area (one blade)	2.98 sq ft
A_g	= Tail rotor geometric disc area total	56.74 sq ft
σ_g (Tail)	= Tail rotor blade geometric solidity ratio (area/disc area)	0.105
A_e	= Elevator area	15.2 sq ft
A_w	= Wing area - Total	28.2 sq ft
	Panels	18.5 sq ft
A_v	= Vertical stabilizer area	18.5 sq ft

3.1.6 Dimensions: The principal dimensions and general data are estimated to be as follows (The following information is not to be used for inspection purposes):

Angle between lines joining center of gravity with points of ground contact point of skid, static deflection of 1W (front elevation)	67 degrees
Critical turnover angle	32.5 degrees
D = diameter of main rotor (not including tracking tips)	44 ft
Number of blades for each rotor	2
W_g = geometric disc loading (W/A_g) psf at 6600 lbs	4.35 lb/ft^2
Airfoil section designation and thickness	9.33 percent Sym Sect Special
Width - main rotor blades turning (including tracking tips)	44 ft 3 in.
Power loading at 1100 hp and 6600 pounds	6.0 lb/hp
Blade chord (main rotor)	27 in.
Blade twist (main rotor)	-.455 deg/ft
Chord, tail rotor blade	8.41 in.
Airfoil section, tail rotor blade	NACA 0010 Modified
Blade twist, tail rotor	0 degree
Airfoil section, elevator	Inverted Clark Y
Airfoil section, vertical stabilizer	Special camber

3.1.6 Dimensions: (Continued)

Aerodynamic center vertical stabilizer	FS 499.0 WL 96.3
Airfoil section, wing	Root NACA0030 Tip NACA0024
Wing span	10 ft 4 in.
Angle of incidence of chord line	14 degrees

3.1.7 Blade and Blade Control Movements: Blade and blade control movements as limited by suitable stops are estimated to be as follows:

3.1.7.1 Main Rotor Blades:

Pitch, collective (measured at the grip)	7 to 29 degrees
Pitch, cyclic (measured at the grip)	±14 degrees F & A ±10 degrees Lateral
Flapping, any direction	+12 degrees
Preconing angle	2.75 degrees
Tip speed 6200 engine rpm	700 ft/sec
Length Maximum - main rotor blades (extended and at rest, one trailing)	52 ft 11.65 in.
Maximum - main rotor blades turning	52 ft 11.65 in.
Main rotor to C_L Tail Rotor	26 ft 8.7 in.
Main rotor to elevator hinge line	16 ft 6.8 in.
Overall height - maximum	13 ft 5.5 in.

3.1.7.1 Main Rotor Blades: (Continued)

Main rotor clearance (ground to tip, rotor static against stops)	7 ft 10 in.
Main rotor clearance (structure to tip, rotor static against stops)	1 ft 7 in.
Diameter tail rotor	8 ft 6 in.
Tail rotor clearance (ground to tip, rotor turning)	4 ft 7.75 in.

SUMMARY WEIGHT STATEMENT

ROTORCRAFT ONLY

ESTIMATED FOR SPECIFICATION

CONTRACT	
ROTORCRAFT - GOVERNMENT NUMBER	AH-1G
ROTORCRAFT - CONTRACTOR NUMBER	209
MANUFACTURED BY	BELL HELICOPTER COMPANY
ENGINE	
MANUFACTURED BY	LYOMING
MODEL	T53-L-13 or T53-L-13A or T53-L-13B
NUMBER	1

1							
2	ROTOR GROUP						945
3	BLADE ASSY					457	
4	HUB					488	
5							
6							
7							
8							
9							
10	WING GROUP						122
11	WING PANELS-BASIC STRUCTURE					122	
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23	TAIL GROUP						59
24	TAIL ROTOR					31	
25	- BLADES				14		
26	- HUB				17		
27	STABILIZER - BASIC STRUCTURE						
28	FINS - BASIC STRUCTURE - INCL. DORSAL			LBS			
29	SECONDARY STRUCTURE - STABILIZER AND FINS						
30	ELEVATOR -			LBS		28	
31							
32							
33	BODY GROUP						1006
34	FUSELAGE OR HULL-BASIC STRUCTURE					648	
35	BOOMS - BASIC STRUCTURE					156	
36	SECONDARY STRUCTURE - FUSELAGE OR HULL					58	
37	BOOMS						
38	DOORS, PANELS + MISC					120	
39	-DOORS, PANELS + MISC BOOMS					24	
40							
41	ALIGHTING GEAR - LAND TYPE						123
42	MAIN					119	
43	AUXILIARY					4	
44	CONTROLS						
45							
46							
47							
48							
49							
50							
51							
52							
53							
54							
55							
56							
57							

1							
2	FLIGHT CONTROLS GROUP						390
3	COCKPIT CONTROLS					29	
4	AUTOMATIC STABILIZATION					30	
5	SYSTEM CONTROLS- ROTOR	NON-ROTATING				136	
6		ROTATING				180	
7	- ELEVATOR					15	
8	- WING						
9	- RUDDER						
10	ENGINE SECTION OR NACELLE GROUP						150
11	ENGINE MOUNT					16	
12	FIREWALL					23	
13	COWL					111	
14							
15							
16	PROPULSION GROUP						1559
17							
18	ENGINE INSTALLATION					547	
19	ENGINE (DRY WEIGHT)				540		
20	RESIDUAL FLUIDS				5		
21	INSTALLATION HARDWARE				2		
22	REDUCTION GEAR BOX, ETC.						
23	ACCESSORY GEAR BOXES AND DRIVES						
24							
25	AIR INDUCTION SYSTEM					53	
26	EXHAUST SYSTEM					10	
27	COOLING SYSTEM					6	
28	LUBRICATING SYSTEM					54	
29	TANKS						
30	BACKING BD TANK SUP + PADDING						
31	COOLING INSTALLATION						
32	PLUMBING, ETC.						
33	FUEL SYSTEM					237	
34	TANKS - UNPROTECTED						
35	- PROTECTED						
36	BACKING BD TANK SUP + PADDING						
37	PLUMBING, ETC.						
38							
39	ENGINE CONTROLS					16	
40	STARTING SYSTEM					50	
41							
42	DRIVE SYSTEM					586	
43	GEAR BOXES				404		
44	LUBE SYSTEM				35		
45	CLUTCH AND MISC.						
46	TRANSMISSION DRIVE				57		
47	ROTOR SHAFT				90		
48							
49							
50							
51							
52	AUXILIARY POWER PLANT GROUP						
53							
54							
55							
56							
57							

1							
2							
3							
4	INSTRUMENT AND NAVIGATIONAL EQUIPMENT GROUP						115
5	INSTRUMENTS					40	
6	NAVIGATIONAL EQUIPMENT					75	
7							
8							
9	HYDRAULIC AND PNEUMATIC GROUP						88
10	HYDRAULIC					88	
11	PNEUMATIC						
12							
13							
14	ELECTRICAL GROUP						170
15	A C SYSTEM						
16	D C SYSTEM					170	
17							
18							
19	COMMUNICATIONS GROUP						175
20	EQUIPMENT					125	
21	INSTALLATION					50	
22							
23							
24	ARMAMENT GROUP						455
25	PASSIVE DEFENSE						243
26	FURNISHINGS AND EQUIPMENT GROUP						84
27	ACCOMMODATIONS FOR PERSONNEL					44	
28	MISCELLANEOUS EQUIPMENT (INCL	0	LBS BALLAST)			22	
29	FURNISHINGS					2	
30	EMERGENCY EQUIPMENT					16	
31							
32							
33							
34	AIR CONDITIONING AND ANTI-ICING EQUIPMENT						86
35	AIR CONDITIONING					86	
36	ANTI-ICING						
37							
38							
39	PHOTOGRAPHIC GROUP						
40	EQUIPMENT						
41	INSTALLATION						
42							
43	AUXILIARY GEAR GROUP						
44	AIRCRAFT HANDLING GEAR						
45	LOAD HANDLING GEAR						
46	ATO GEAR						
47							
48							
49							
50							
51							
52							
53							
54	WT. RECORD ADJUSTMENT						
55	MFG. VARIATION, 1% BELL CONTROLLED WEIGHT						46
56							
57	TOTAL - WEIGHT EMPTY - PAGES 2, 3, AND 4						5816

	LOAD CONDITION	BASIC	HOG I	SCOUT I	HOG II	SCOUT II
6	PILOT	200	200	200	200	200
7	GUNNER	200	200	200	200	200
8	PASSENGERS (NOT TROOPS)					
9	LITTER PATIENTS					
10	MEDICAL ATTENDANT					
12	CARGO					
13	MIRROR-CARGO LOADING					
14	CARGO SUSPENSION ASSY					
15	FUEL	1600	550	1414	334	1290
16	FUEL - TRAPPED	9	9	9	9	9
17	FUEL - AUXILIARY					
18	OIL - ENGINE	27	27	27	27	27
19	OIL - ENG-TRAPPED	2	2	2	2	2
21	OIL - TRANS + GEAR BOXES	27	27	27	27	27
24	CUSHIONS - PILOT SEAT					
25	CUSHIONS - COPILOT SEAT					
27	SEATS - TROOP					
28	SEATS - TROOP COMMANDER					
29	SEAT - LITTER ATTENDANT					
31	BELTS - SAFETY					
32	BELT EXTENSIONS					
33	SMOKE GRENADES (24)	44				
34	SMOKE GRENADE DISP. (2)	36				
35	LITTERS					
36	LITTER SUPPORTS					
37	MEDICAL EQUIPMENT					
38	PALLET AND DRUM 7.62MM	127	127	127	127	127
39	AMMO 7.62 MM	520	390	520	390	520
40	STANCHIONS					
41	MINIGUN PODS (2)			490		490
42	MINIGUN AMMO-PODDED			165		165
43	CARGO TIE DOWN RINGS					
44	STORES PYLON	36	98	98	98	98
45	XM159E PODS (4)		472			
46	M151/XM429 ROCKETS (76)		1582			
47	XM-159C PODS (4)				520	
48	XM229/XM429 ROCKETS (62)				1750	
49	XM157A PODS (2)	114		114		
50	M151/XM429 ROCKETS (14)	291		291		
51	XM157B PODS (2)					134
52	XM229/XM429 ROCKETS (14)					395
53	USEFUL LOAD	3233	3684	3684	3684	3684
55	WEIGHT EMPTY (PAGE 4)	5816	5816	5816	5816	5816
57	GROSS WEIGHT	9049	9500	9500	9500	9500

ROTORCRAFT
SUMMARY WEIGHT STATEMENT
USEFUL LOAD GROSS WEIGHT

	XM-28 ALTERNATE CONFIGURATION MISSIONS					
LOAD CONDITION	BASIC	HOG I	SCOUT I	HOG II	SCOUT II	
PILOT	200	200	200	200	200	
GUNNER	200	200	200	200	200	
PASSENGERS (NOT TROOPS)						
LITTER PATIENTS						
MEDICAL ATTENDANT						
CARGO						
MIRROR-CARGO LOADING						
CARGO SUSPENSION ASSY						
FUEL	1600	538	1467	322	1343	
FUEL - TRAPPED	9	9	9	9	9	
FUEL - AUXILIARY						
OIL - ENGINE	27	27	27	27	27	
OIL - ENG-TRAPPED	2	2	2	2	2	
OIL - TRANS + GEAR BOXES	27	27	27	27	27	
XM-28 WEIGHT INCREASE FOR	6	6	6	6	6	
1 40MM IN LIEU OF 1 7.62MM						
CUSHIONS - COPILOT SEAT						
PALLET AND DRUM 40MM	75	75	75	75	75	
AMMO 40MM	190	190	190	190	190	
SEATS - TROOP COMMANDER						
SEAT - LITTER ATTENDANT						
BELTS - SAFETY						
BELT EXTENSIONS						
SMOKE GRENADES (24)	44					
SMOKE GRENADE DISP. (2)	36					
LITTERS						
LITTER SUPPORTS						
MEDICAL EQUIPMENT						
PALLET AND DRUM 7.62MM	63	63	63	63	63	
AMMO 7.62MM	260	195	260	195	260	
STANCHIONS						
MINIGUN PODS (2)			490		490	
MINIGUN AMMO-PODDED			165		165	
CARGO TIE DOWN RINGS						
STORES PYLON	36	98	98	98	98	
XM159B PODS (4)		472				
M151/XM429 ROCKETS (76)		1582				
XM-159C PODS (4)				520		
XM229/XM429 ROCKETS (62)				1750		
XM157A PODS (2)	114		114			
M151/XM429 ROCKETS (14)	291		291			
XM157B PODS (2)					134	
XM229/XM429 ROCKETS (14)					395	
USEFUL LOAD	3180	3684	3684	3684	3684	
WEIGHT EMPTY (PAGE 4)	5816	5816	5816	5816	5816	
GROSS WEIGHT	**8996**	**9500**	**9500**	**9500**	**9500**	

3.2 General Features of Design and Construction:

3.2.1 General Interior Arrangement: The cabin arrangement shall provide for the pilot and gunner seated in tandem within a single contoured cockpit. The cabin arrangement shall be compatible with the 5th and 95th percentile Army Aviator with associated personal and survival equipment. as specified by Technical Report EP-150, Anthropometry of Army Aviators. The gunner shall occupy the forward seat with the pilot directly aft and slightly above. Foot rests shall be provided at the gunner's station so as to preclude inadvertent operation of the antitorque pedals by the gunner during maneuvering flight when the pilot is in control of the aircraft.

3.2.2 Materials and Standard Parts: Materials and standard parts will conform to applicable publications as specified herein. Specifications and standards for all materials, parts, and Government certification and approval of processes and equipment, which are not specifically designated herein and which are necessary for the execution of this specification, shall be selected in accordance with MIL-STD-143. Bolts shall have a 16:1 maximum length/diameter ratio and minimum bolt diameter shall be 3/16 inch. Bolt head size shall be limited to hexagonal external wrenching and will be so incorporated to permit interchangeability for temporary or emergency purposes. For aircraft structure and components requiring removal or maintenance in the field, only AN and MS standard steel bolts will be used. No splined or special heads requiring special wrenches will be used in replaceable field items. Special bolts may be used where required by design. Anchor nuts will be used in preference to free bolt and nut. Adequate clearance will be provided to permit removal or installation of nuts. Screws should be of the cross recess head type.

3.2.3 Workmanship: The workmanship shall be in accordance with high grade aircraft construction practices to ensure proper operation, service life and safety.

3.2.4 Production, Maintenance, and Repair: The design of the aircraft shall be such as will ensure ease of production, installation of power plant and equipment, and ease of general maintenance. Special attention shall

3.2.4 Production, Maintenance, and Repair: (Continued) be given to the ease with which the component parts of the structure and installation can be inspected, maintained and repaired. A minimum of special tools will be required for component changes. In addition, provisions shall be incorporated for alternate lifting points independent of the main rotor mast and transmission to allow for quick recovery of the aircraft with hook-up aids that can be fabricated locally. Provisions for the installation of a maintenance hoist to facilitate installation and removal of the engine and dynamic components shall be provided.

3.2.5 Interchangeability and Replaceability: The component parts of all aircraft produced in accordance with this specification shall be interchangeable or replaceable, as the case may be, in accordance with and to the extent required by MIL-I-8500 and shall be manufactured in conformance with the provisions of such specification.

3.2.5.1 Interchangeable Items Between Models AH-1G and UH-1C Aircraft: The items listed in Appendix III-A shall be those which are interchangeable between the Models AH-1G and UH-1C aircraft.

3.2.5.2 Common Tools: The tools listed in Appendix III-B shall be common to the Models AH-1G and UH-1C aircraft.

3.2.5.3 Retirement Life: All Model AH-1G peculiar items assigned a retirement life shall be serialized. The items shall be approved by the procuring agency.

3.2.6 Finish: The finish for the aircraft and parts shall be in accordance with Bell Helicopter Company (BHC) Finish Specification 204-947-002.

3.2.6.1 Exterior Finish: The exterior finish shall be lusterless olive drab (camouflage), Army chip No. X34087 in accordance with Department of Army Technical Bulletin TB 746-93-2.

3.2.7 Identification and Markings: The aircraft and its components shall be identified and otherwise marked in accordance with Department of the Army Technical Bulletin TB 746-93-2 Painting and Marking of Army Aircraft, (42) (48)

3.2.7 Identification and Markings: (Continued)

except all camouflage markings shall be lusterless black including patches painted on fuel covers and elsewhere. The arrow on the tail boom section shall be lusterless red and shall be reduced in size. Decals shall be lusterless black, wherever possible, and shall have opaque backgrounds.

3.2.8 Extreme Temperature Operation: The aircraft as a whole, including aeronautical equipment, shall be designed for operation within a range of ambient temperature from -65 to +125°F with JP-4 fuel and MIL-L-7808 oil. At either temperature extreme, each individual component of the aircraft shall operate within limits established by the design criteria. Because of limitations placed on the aircraft by the use of the battery described in 3.13.1.2.2, the minimum self-contained starting temperature of the aircraft shall be 0°F with the battery supplied and -25°F with the alternate battery.

3.2.9 Climatic Requirements: The aircraft and its equipment shall not be adversely affected by other climatic conditions incident to the temperature range as outlined in 3.2.8 and shall be capable of transfer from one climate to another without penalty of extensive modification and adjustment. Storage within a temperature range of -80 to +160°F for 72 hours shall not permanently impair operating capabilities.

3.2.10 Lubrication: Lubrication of the aircraft shall conform to the requirement of MIL-STD-838. MIL-L-23699 lubricating oil shall be used in the engine, main transmission, 42-degree and 90-degree gearboxes above -25°F.

3.2.11 Equipment and Furnishings Installation: The equipment and furnishings specified in Appendixes I-A and I-B of this specification and as described in other portions of this specification shall be installed in the quantity and under the applicable conditions set forth.

3.2.12 Crew: The crew shall consist of the pilot and gunner or pilot alone.

3.2.13 Maintainability: The aircraft and its related subsystems shall be designed in accordance with maximum maintainability as a goal. Special consideration shall be given to provisions for access, rapid removal and replacement of components.

3.3 Aerodynamics:

3.3.1 Aerodynamic Design: The fuselage exterior shall be smooth, featuring fairness of surfaces and trueness of contours and minimizing of drag.

3.3.2 Stability and Control:

3.3.2.1 Control Characteristics: MIL-H-8501 shall be used as a design guide for the stability and control characteristics for this aircraft, except for paragraph 3.6, "Instrument Flight Conditions". In addition, the aircraft shall be safely and adequately controlled in flight, with the stability augmentation system operative or inoperative (1) using the alternate controls provided for the gunner's station, for all speeds from hover to red line airspeed (V_L). This must be possible without assistance from the controls (44) in the rear cockpit. Normal flight as defined by paragraph 6.3.24 of MIL-S-8698 must be possible except that paragraph 6.3.24(b)(1) must be amended to include flight to V_L.

3.3.2.2 Center of Gravity Limits: For all practical loading and mission configurations and for the center of gravity and weight range that is utilized for each mission, the aircraft shall meet the requirements of 3.3.2.1.

3.4 Structural Design Criteria: All limit flight load factors derived from the criteria as shown below shall be multiplied by 1.5 to obtain ultimate load factors as specified in MIL-S-8698. The minimum yield factor of safety shall be 1.0.

3.4.1 Limit Flight Load Factors: Positive limit flight load factors at a design weight of 6600 pounds shall be at 3.5g. At all alternate gross weights, the load factors shall be in accordance with figure 8. Negative limit load factor shall be -0.5 at design gross weight.

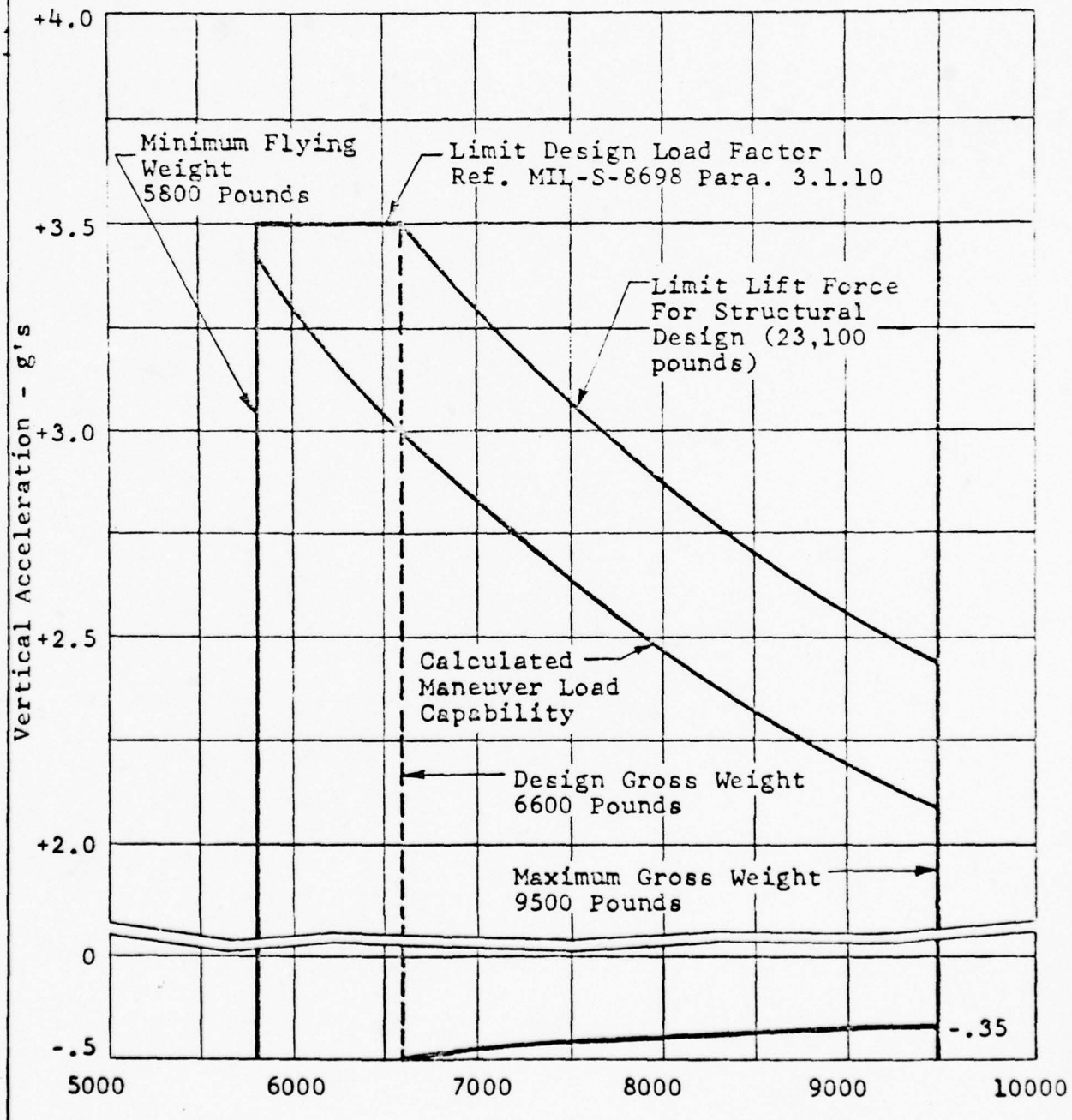


Figure 8.—Gross weight vs flight load factor.

3.4.2 Ultimate Ground Load Factors:

3.4.2.1 Landing: The maximum landing load factor shall not exceed 4.5 ultimate at design gross weight of (2) 6600 pounds. For allowable limit sink speeds versus gross weight, see figure 9.

3.4.2.2 Crash Landing Load Factors Ultimate (Acting Separately): Those items (except transmission) of which failure would be apt to cause a hazard to the occupants, shall be designed (fuel tanks 1/2 full) for:

n_z = 15g Down

n_y = 5g Side

n_x = 15g Forward

Load factors for transmission shall be 8-4-8 respectively, as above.

3.4.2.3 Sinking Speed: The sinking speed requirements of MIL-S-8698, paragraph 3.4.2 shall be applicable.

3.4.3 Limit Diving Speed: The limit dive speed shall be the design maximum level flight speed multiplied by a factor of 1.20.

3.4.4 Ditching Criteria: Not applicable.

3.4.5 Flutter Characteristics: The aircraft shall be free of aerodynamically induced flutter and divergence at speeds up to 1.10 times the limit dive speed. The rotor blades shall be free of flutter and divergence at rotational speeds and airspeeds throughout the complete flight range.

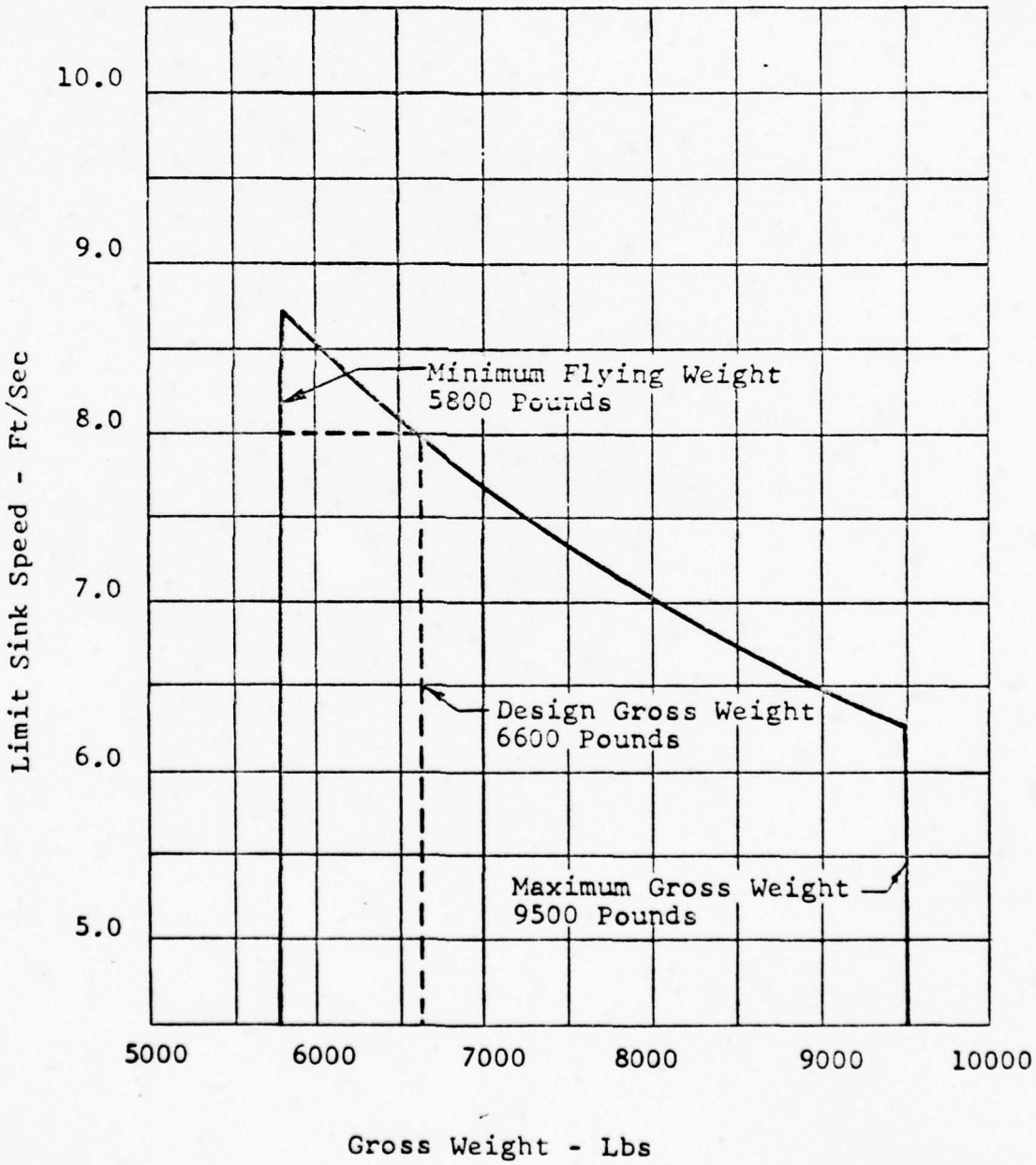


Figure 9.—Gross weight vs limit sink speed.

7872-55420

3.4.6 Mechanical Instability and Flywheel Type Resonance: No mechanical instability and flywheel type resonance shall exist as defined in MIL-S-8698 and MIL-H-8501.

(3) 3.4.7 Rotor Induced Vibration: Rotor induced fuselage and cyclic stick vibration shall be measured in accordance with, and shall not exceed, the levels of MIL-H-8501.

3.4.8 Main Rotor Speed:

3.4.8.1 Rotor Speed, Design Minimum, Power-On: The minimum practicable rotor speed attainable in power-on flight at the basic design gross weight shall be 294 rpm.

3.4.8.2 Rotor Speed, Design Maximum, Power-On: The maximum rotor speed attainable, power-on, shall be 324 rpm.

(4) 3.4.8.3 Rotor Speed Limit, Power-On: Rotor speed limit, power-on is the design maximum rotor speed (324 rpm) power-on, multiplied by the factor 1.10 (356 rpm).

3.4.8.4 Rotor Speed, Design Minimum, Power-Off: The minimum practicable rotor speed attainable in auto-rotative flight shall be 294 rpm.

3.4.8.5 Rotor Speed, Design Maximum, Power-Off: The maximum rotor speed attainable, power-off, shall be 339 rpm.

(5) 3.4.8.6 Rotor Speed, Limit, Power-Off: Rotor speed limit, power-off is the design maximum rotor speed, power-off (339 rpm), multiplied by the factor 1.05 (356 rpm).

3.4.9 Speed, Design Maximum:

3.4.9.1 Level Flight Vu: The design maximum level flight speed at sea level is 175 knots.

3.4.9.2 Sideward Flight: The design maximum sideward flight at sea level is 35 knots.

3.4.9.3 Rearward Flight: The design maximum rearward flight at sea level is 30 knots.

3.5 Main Rotor and Wing Group:

3.5.1 Main Rotor Group:

3.5.1.1 Description and Components: The main rotor shall be a two bladed, semirigid, seesaw type employing preconing and underslinging to ensure smooth operation. Each blade shall be connected to a common yoke by means of a grip and suitable pitch change bearings with tension straps to carry centrifugal forces. Seesaw motion of the rotor shall take place about an axis perpendicular to the spanwise axis of the rotor. Collective pitch and cyclic control pitch shall take place about a line through the 24.3 percent chord at the tip and 25 percent chord at the butt end of the blade. The rotor shall be mounted to the mast by means of a trunnion through the seesaw bearings. All major components shall be designed for installation and removal in a minimum possible time. Dust boots shall be incorporated on all pitch-change mechanisms and dampers where practicable.

3.5.1.1.1 Lubrication: Pitch-change and pillow-block bearings shall not require lubrication. Grease fittings shall be provided where necessary in the main rotor control system for periodic lubrication.

(43) 3.5.1.1.2 Markings: Each rotor blade shall be marked in accordance with Department of the Army Technical Bulletin TB 746-93-2 and serial numbered.

(6) 3.5.1.2 Main Rotor Blade Construction: The blades shall be of all-metal construction. All structural components shall be joined to make the blade assembly by means of metal-to-metal bonding. The adhesive employed in bonding shall conform to MIL-A-5090 and/or MIL-A-25463. The blades shall be individually interchangeable. Changes in pitch link adjustment and trim tab settings may be utilized to obtain optimum track. These blades shall not incorporate ice protection.

3.5.1.2.1 Balance: The weight and balance of each blade shall be controlled to ensure complete interchangeability by adjusting ballast at time of manufacture.

3.5.1.3 Blade Retention: Each blade is retained by means of the main blade retention bolt and a drag brace.

3.5.1.4 Main Rotor Head: The main rotor head shall consist of the "door hinge" hub assembly, which is comprised of the yoke, yoke extensions, blade grips, and bearings. Means shall be provided for statically balancing the hub assembly.

3.5.1.4.1 Components:

3.5.1.4.1.1 Yoke: The rotor yoke shall be a steel forging.

3.5.1.4.1.2 Blade Grips: The blade grips shall be steel forgings. Horn assemblies shall be provided for attachment of the pitch control mechanism. The horn assemblies shall be forgings.

(7) 3.5.1.4.1.3 Bearings: All bearings used shall be the same type as those used during qualification test.

3.5.1.4.1.4 Yoke Extensions: The yoke extensions shall be steel forgings.

3.5.1.4.2 Main Rotor Head Control System Construction: The main rotor head control system shall consist of a swashplate assembly, scissors assembly, and static stops.

3.5.1.4.2.1 Swashplate Assembly: The swashplate shall transfer the cyclic stick control motions from the fuselage-based system to the rotating control system. The assembly shall consist of a nonrotating ball-mounted inner ring assembly which can be tiled in any direction, and an outer ring assembly which rotates on the inner section and transfers the cyclic control motions from the nonrotating system to the blades.

3.5.1.4.2.2 Scissors: The scissors shall be made of forged or wrought material and shall transfer motion from the rotating swashplate to the pitch horns.

3.5.1.4.2.3 Static Stops: Static stops shall be provided as an integral part of the hub assembly to limit seesaw motion of the hub. These stops shall prevent contact of the blades and airframe during normal starts or stops and during normal flight maneuvers.

3.5.1.4.2.4 Collective Friction Device: A collective friction device shall be provided to reduce the transient relative oscillation between the mast and collective sleeve.

3.5.1.5 Blade Folding: Not applicable.

3.5.1.6 Blade Securing: A tie-down device for securing the main rotor blades shall be provided.

3.5.1.7 Blade Restrainers: Not applicable.

3.5.1.8 Blade Tracking: Changes in pitch link adjustment and trim tab settings are utilized to obtain optimum track.

3.5.1.9 Rotor Tachometer: A rotor tachometer shall be provided as part of the dual tachometer on the instrument panel.

3.5.2 Wing Group:

3.5.2.1 Description and Components: The aircraft shall have a fixed cantilever wing with a span of 124.0 inches (including tip) to provide additional lifting surfaces and serve as a support for the hardpoints.

3.5.2.2 Construction: Each wing shall be constructed of two main spars, ribs, aluminum and/or aluminum honeycomb skin. The airfoil shall be tapered and shall have a mean chord of 30 inches. Hardpoint attachments shall be provided at butt line 42.5 and 59.75 on each wing for the attachment of external stores. The inboard fittings shall be designed to accommodate a 670 pound load and the outboard fitting a load of 670 pounds with the following limit load factors acting separately at the store center of gravity.

Down	4.0g
Up	2.0g
Side	±1.5g
Forward	4.0g

Fittings and structure shall be designed to accommodate weapon firing loads acting at the line of action of the weapons.

(8) 3.6 Antitorque (Tail) Rotor and Tail Group:

3.6.1 Antitorque (Tail) Rotor Group:

3.6.1.1 Description and Components: The tail rotor shall be a tractor type two-bladed, semirigid, delta-hinge type employing preconing and underslinging. Each blade shall be connected to a common yoke by means of a grip and suitable pitch-change bearings. The blade and yoke assembly shall be mounted on the tail rotor shaft by means of a delta-hinged trunnion to minimize rotor flapping. A pitch-change mechanism shall be provided to increase or decrease the pitch of the blades. Dimensional control of the hub assembly shall be maintained to insure interchangeability of individual blades. A dust boot shall be incorporated on the pitch-change mechanism where practicable. Provisions shall be incorporated for quick removal of one tail rotor blade for air transportability.

3.6.1.2 Tail Rotor Blade Construction: The blades shall be constructed of aluminum alloy sheet suitably reinforced at the root end for attachment purposes and balanced to ensure individual interchangeability. The blades shall be bonded with adhesive conforming to MIL-A-5090. A corrosion-resisting steel abrasion strip shall be bonded to the leading edge of the blade. These blades shall not incorporate ice protection.

3.6.1.2.1 Identification: Each of the blades shall be serial numbered.

3.6.1.3 Blade Restrainer: Not applicable.

3.6.1.4 Rotor Head: The tail rotor head shall consist of grips, yoke and flapping axis trunnion.

3.6.1.4.1 Yoke: The yoke shall form the hub of the tail rotor and shall be constructed from a steel forging.

3.6.1.4.2 Flapping Axis Trunnion: The flapping axis trunnion shall be made from a steel forging. This attaches the yoke to the shaft through the flapping axis bearings. It shall be splined to the tail rotor shaft in order to drive the rotor.

3.6.1.4.3 Blade Grip: The blade grips shall be constructed of aluminum alloy forgings. The grips attach the blades to the yoke through pitch change bearings.

3.6.1.5 Rotor Head Control:

3.6.1.5.1 Blade Pitch Mechanism: The 90 degree gearbox transmits the power from the tail rotor drive shaft which drives the tail rotor blades. The 90 degree gearbox shall include a sprocket, screwjack, push-pull tube assembly and guide assembly. A cable and chain shall actuate the sprocket which moves the push-pull tube which in turn changes the pitch of the tail rotor blade. Preloaded bearings shall be provided to eliminate axial looseness between the rotating crosshead and nonrotating push-pull tube.

3.6.1.5.2 Bearings: All bearings used shall be the same type as those used during qualification test.

3.6.1.5.2.1 Lubrication: Provisions shall be made for purging all bearings requiring grease lubrication.

3.6.2 Tail Group:

3.6.2.1 Description and Components: The tail group shall consist of a controllable elevator and vertical fin.

3.6.2.2 Stabilizer: Not applicable.

3.6.2.3 Elevator: The elevator shall be of aluminum alloy or magnesium construction and shall be installed on the tail boom. The elevator shall incorporate a tapered, inverted Clark "Y" airfoil section. The elevator shall be attached to the tail boom by means of antifriction bearings and bolts. The leading edge shall be protected against rocket debris.

3.6.2.4 Fin: The swept-back vertical fin shall be a cambered airfoil section extending up from the aft end of the tail boom. The fin shall include an aerodynamic fairing around the 90 degree gearbox, and shall house a portion of the tail rotor drive shaft. The fin shall be of aluminum alloy and fiberglass construction.

3.7 Body Group:

3.7.1 Fuselage:

3.7.1.1 Description: The fuselage shall consist of two main sections: the forward section and the aft section or tail boom. The forward section shall include tandem crew cockpits, landing gear, wings, power plant and pylon assembly. Entrance to the cockpits is provided by utilization of hinged canopy entrance doors. The aft section shall support the cambered fin, tail skid, elevator, tail rotor and tail rotor drive system. Precautionary measures outlined in Paragraph B.4-10.3 of the HIAD shall be complied with to prevent corrosion due to dissimilar metals in contact.

3.7.1.1.1 General Requirements:

3.7.1.1.1.1 Fasteners: Quick release fasteners shall be provided for access doors used for electronics, electrical hydraulic, armament and drive system access.

3.7.1.1.1.2 Latches: Latches used shall be of simple action, corrosion-resistant or adequately protected against corrosion. All latches and locks on doors shall be readily visible for inspection prior to flight to ensure positive engagement. In addition, latches for the engine and transmission cowls shall include a high visibility indicator which shall extend through the adjacent skin so that ground personnel may visibly verify that the latches are properly engaged. All latches and securing devices on doors and hatches shall be positive-acting in order to avoid doors opening unintentionally in flight.

3.7.1.1.1.3 Sealing: Bulkheads shall seal off the cockpit, ammunition and armament bays, transmission compartment and fuel compartment. Solid web decks shall be used to seal off the fuel compartment as well as to isolate the engine compartment. All equipment including the engine, transmission, ammunition and armament compartments shall be readily accessible through doors or access panels. All doors and hatches shall be provided with a seal to prevent entrance of sand, dirt, or spray. Joints of doors and hatches shall be smooth with no significant gaps to cause a breakdown of airflow.

3.7.1.1.1.4 Weapon Protection: The airframe shall be designed to provide adequate strength and surface protection from spent ammunition cases, links, ejected cartridges, blast, heat, recoil, erosion and corrosion resulting from normal repetitive firing of rockets and guns. Aircraft mechanical instability or structural failure of airframe components due to weapon firing shall be eliminated.

3.7.1.2 Construction:

3.7.1.2.1 Forward Section: The forward section shall employ aluminum alloy skin and aluminum, titanium and fiberglass honeycomb beam construction. Honeycomb deck panels and a minimum of bulkheads attached to the main beams produce a box-beam structure. These beams, which make up the main primary structure, shall support the engine, transmission, tail boom, landing gear, wings, fuel tanks and turreted weapons. The panel providing fuel tank filler opening, shall employ a suitable material bonded to the honeycomb panel to prevent crushing from the fuel nozzle.

3.7.1.2.2 Tail Boom: The tail boom shall be tapered semi-monocoque structure employing aluminum skin, longerons, and stringers. The tail boom shall attach to the forward section by four bolts. The rear of the tail boom shall support the tail rotor, fin, and elevator. The tail rotor drive shaft shall be located on the top of the tail boom and shall be housed within an easily opened fairing. Provisions for two detachable tie-down points, one for each side of the tail boom, shall be provided for air transportability.

3.7.1.3 Crew Station Subsystems: The pilot's station shall be located forward of the pylon assembly and the gunner's station shall be located directly forward and below the pilot. The cockpit shall be sealed from entry of water and weapon gases when the aircraft is at rest or in flight. Provisions shall be incorporated to protect door seals from damage as a result of normal entrance and exit by the crew.

3.7.1.3.1 Field of View: Maximum field of view shall be provided for the gunner by minimizing the structural obstructions and providing large transparent areas in the cockpit. Field of view for the pilot and gunner shall be at least as good as that provided in the prototype aircraft.

3.7.1.3.2 Enclosure: The cockpit enclosure shall extend from the nose of the aircraft to the front of the pylon compartment.

3.7.1.3.3 Transparent Panels: Enclosures shall be fabricated of stretched high strength clear acrylic plastic or other high optical quality nonshatter material. Plastic panels shall be installed in accordance with the requirements of MIL-P-6997.

3.7.1.3.4 Entrances: Entrance to the pilot's cockpit shall be through a canopy door located on the right side of the aircraft and entrance to the gunner's cockpit is through a canopy door located on the left side. Both doors are hinged at the top and shall swing outward and up to provide access. Both doors shall have supports incorporating locks to hold the door in the full open and intermediate positions in a 45 knot wind or in hover at maximum alternate gross weight.

3.7.1.3.5 Exits:

3.7.1.3.5.1 Normal: Refer to 3.7.1.3.4

3.7.1.3.5.2 Emergency: The pilot and gunner's doors shall be individually jettisonable from inside by means of a single release handle for each door in addition to the normal means for opening these doors. The emergency release handles shall be designed and located to preclude the possibility of their use by personnel boarding or leaving the aircraft on the ground. Identification of emergency exits shall be in accordance with MIL-A-25165.

3.7.1.3.6 Steps and Grips: The fuselage shall have convenient access steps provided for both pilot and gunner. Handgrips shall be provided for both cockpits and shall be of the design incorporated in the prototype aircraft. Suitable steps and handgrips shall be provided in the transmission cowl area to provide access to the main mast nut for inspection.

3.7.1.3.7 Flooring: The flooring shall be of aluminum honeycomb construction. A slip proof (low profile rigidized top face) floor surface shall be provided. Maintenance work platform areas shall be designed for the weight of a 200 pound man.

3.7.1.3.8 Soundproofing Noise: The noise level tolerances of MIL-A-8806 shall be met in the design, of pilot and gunner stations. With the weapons firing, the design objective shall be for an impulse noise of less than 140 decibels. Soundproofing material in accordance with MIL-S-5659 shall be installed in accordance with the requirements of MIL-S-6144.

3.7.1.3.9 Furnishings and Equipment:

3.7.1.3.9.1 Seats: The pilot's seat shall be capable of adjustment vertically, but not fore and aft. The gunner's seat shall be fixed. The seat shall be armored in accordance with 3.19.3. The pilot's seat design shall meet the requirements for seat reference point and adjustment set forth in MS33575. Anthropometric data to derive spatial relationships will be taken from Technical Report EP-150. Consideration will be given to the inclusion of clothing dimensions, protective headgear, armored torso shield and personal combat and survival equipment, i.e., personal weapon, canteen, etc. Contoured seat cushions and back supports will be made from varying densities of foam for vibration attenuation and crew comfort. Seat back angles shall be approximately 75 degrees from the horizontal to best fit the cruise attitude of the aircraft and to provide maximum pilot visibility in cruise flight. The strength requirements of the seats, belts, harnesses, and attachments, incorporating the weight of the armored seat, armored panels, and a 220 pound occupant shall be as follows:

(9)

Forward	15g
Aft	5g
Sideward	15g
Down	15g
Up (thru lap belt)	7.5g

3.7.1.3.9.2 Safety Belts and Harness: Lap belts and shoulder harnesses shall be installed on each seat. The shoulder harness inertia reel, with automatic (self-locking) and manual locking features, shall be attached to the seat. The inertia reel lock shall be located on the left console in each cockpit. The rated strength of belts and shoulder harnesses shall be provided at their attachment point.

3.7.1.3.9.3 Ash Trays: An ash tray shall be provided in each of the pilot's and gunner's compartments. The trays shall be minimum weight.

3.7.1.3.10 Emergency Equipment:

3.7.1.3.10.1 Fire Extinguisher: One Government-furnished hand fire extinguisher, FSN 4210-555-8837, vaporizing liquid type shall be installed aft of the gunner's collective control lever.

3.7.1.3.10.2 First-Aid Kit: One Government-furnished first-aid kit shall be installed in the crew compartment. The first-aid kit shall be Med. Stock 9-196-650.

3.7.1.3.10.3 Survival Kit: Complete provisions for the installation of two Government-installed survival kits in the compartment aft of the pilot's seat shall be provided. The compartment shall be capable of accepting two of the following types of survival kits:

Hot Weather	FSN 8465-973-1861
Cold Weather	FSN 8465-973-1862
Over Water	FSN 8465-973-1863

3.7.1.3.10.4 Canopy Breaking Tool: Two Government-furnished canopy breaking tools shall be installed one accessible to the pilot and one accessible to the gunner.

(47) 3.7.1.3.10.5 Fire Detector Installation: A detector system in accordance with MIL-F-7872 shall be provided in the engine section. Indication shall be by means of two red lights, one each installed on the pilot's and gunner's instrument panels.

3.7.1.3.11 Environmental Control System: The environmental control system shall utilize engine bleed air to provide personnel comfort by controlling temperature and humidity. Personnel comfort shall be provided with an outside temperature of from -65° to +95°F and an absolute humidity of from 0 to 183 grains of moisture per pound of dry air. In the heating mode an inside temperature of +40°F shall be obtained with an outside temperature of 0°F within 10 minutes of initiation.

3.7.1.3.11.1 Ventilating System: The cabin ventilation system, which shall serve as a backup system for the environmental control system, shall be capable of providing outside air at a minimum rate of 450 feet per minute linear flow measured at the crew members' head and groin. The cabin air inlet shall be located so as to eliminate ingestion of noxious fumes caused by weapons firing. Two air outlets shall be provided at each crew station.

3.7.1.3.12 Miscellaneous Equipment:

3.7.1.3.12.1 Instrument Panels: Instrument panels shall be constructed of suitable material and shall be painted a dull black to prevent reflective glare. Instrument panels shall be in accordance with MIL-I-5997. A shock-mounted instrument panel shall be provided for the (52) pilot and gunner. The overall layout of instruments and required controls and displays shall be in general accordance with Paragraphs 4.2 through 4.6, 5.1a, 5.2 through 5.7, 5.9, 6.2.2, 8.2a, 8.3, 8.4, 9., 11.5, 11.6 and 11.8 of MIL-STD-250. The pilot's and gunner's instrument panels shall contain the instruments listed in 3.21.1.1, 3.21.1.2, 3.21.1.3, and 3.21.1.4. The pilot and gunner shall be provided with left hand and right hand consoles.

3.7.1.3.12.2 Rear View Mirror: A rear view mirror shall be installed on the right side windshield support above the gunner's instrument panel and shall be used for internal viewing only.

3.7.1.3.12.3 Map and Data Case: Not required.

3.7.1.3.12.4 Check List Holder: A check list holder shall be provided for the pilot.

3.7.1.3.12.5 Rain Removal: Rain removal shall be provided by using bleed air from the engine through a nozzle directed to the outside base of the center panel. The pilot shall control the operation.

3.7.1.3.12.6 Pyrotechnic Equipment: Refer to 3.18.5

3.7.1.4 Cargo Compartment: Not applicable.

3.7.1.5 Equipment Compartments: Not required.

3.8 Alighting Gear:

3.8.1 General Description and Components: The landing gear shall consist of two tubular main skids and streamlined curved fore and aft cross members. The skids shall be located below and outboard of the lower corners of the fuselage.

3.8.2 Main Landing Gear: The main landing gear shall be of the skid type. The skids shall be constructed of aluminum alloy tubing of sufficient size to provide for satisfactory operation from terrain having subsoil modulus factor K of not more than 90. Suitable skid shoes shall be provided under the skids extending the full length of skid normally in contact with surface. These shoes shall extend into the fore and aft curved portions of the skid. The skids shall be attached to the cross tubes by means of fittings and bolts. The cross members shall be constructed of aluminum and shall be attached to the fuselage beams at four points.

3.8.3 Auxiliary Landing Gear: A steel tubular type skid shall be installed on the aft end of the tail boom to protect the tail rotor blades during tail low landing.

3.9 Alighting Gear (Water Type): Not applicable.

3.10 Flight Control System:

3.10.1 Primary Flight Control System: The primary flight control system shall consist of cyclic, collective, (10) and tail rotor pitch controls and shall be in accordance with MIL-F-9490. The flight controls shall be routed as directly as possible through the aircraft by means of a (11) series of push-pull tubes and bellcranks. Positive stops shall be provided in the control system to prevent movement (12) of the controls beyond safe limits. In addition, the pilot's primary flight controls shall be in accordance with 3.19.9. Provisions shall be made for rapid visual inspection of the primary flight control system without the use of special tools or major disassembly of the airframe.

3.10.1.1 Flight Station Controls: The flight controls shall consist of a cyclic control stick for lateral and (13) longitudinal control, a collective control lever incorporating a twist grip for engine power control, and foot pedals for directional control. The cyclic control stick grip shall have the following functions:

3.10.1.1 Flight Station Controls: (Continued)

Trigger (guarded) - turret fire

Chinese Hat - forward: radio, aft: ICS, left and right not used.

Top thumb button - force trim release

Side thumb button - wing stores fire

Lower thumb button - SAS release

3.10.1.2 Longitudinal and Lateral Cyclic Controls: The cyclic control sticks shall actuate lateral and longitudinal control of the main rotor. The pilot's cyclic control stick shall incorporate stick centering controls and force gradient system. The gunner's side arm controls shall be mechanically connected to the pilot's controls. Both the lateral and longitudinal systems shall incorporate push-pull tubes, bellcranks, and a dual hydraulic system. Hydraulic boost cylinders shall be incorporated in the fixed control system to prevent control-force feedback under all normal operating conditions and maneuvers. The stick centering devices shall be designed to provide desirable force gradients at the hand grip. The entire system shall include provisions for inspection. Adjustment means shall be provided at a minimum of easily accessible points in the longitudinal and lateral systems. The cyclic control system shall be designed in accordance with MIL-S-8698.

3.10.1.3 Directional - Tail Rotor Pitch Control: The directional controls shall control tail rotor pitch change. The tail rotor pitch-control system shall consist of adjustable pedals, push-pull tubes, pulleys, cables, fairleads, chain and sprocket and shall incorporate a single hydraulic system and pedal centering force gradient device. Control of the force gradient device shall be at the pilot's station. The gunner shall be provided with a force gradient on-off switch. The pilot's and gunner's pedals shall be interconnected. The system shall be designed in accordance with MIL-S-8698.

3.10.1.4 Vertical-Collective Pitch Control: Collective pitch control levers with suitable twist-type hand grips for engine power control shall be provided for the pilot and gunner. The pilot's collective pitch lever shall be provided with a downlock to permit nonrated personnel to ground run the aircraft. The collective pitch control shall incorporate a tubular pivot-shaft assembly, push-pull tubes, improved friction device, bellcranks, and a dual hydraulic system. The collective pitch-control system shall be designed in accordance with MIL-S-8698.

3.10.2 Secondary Flight Control System: Not applicable.

3.10.3 Trim Control Systems: Not applicable.

3.10.4 Stability and Control Augmentation System: A contractor-furnished three axis (pitch, roll and yaw) stability and control augmentation system, Bell Model 570A, shall be installed. The system shall be designed in accordance with BHC Specification 570-947-001. (14)

3.11 Engine Section or Nacelle Group:

3.11.1 Description and Components: The engine section shall consist of that section above the aft portion of the fuselage. This section shall consist of engine mounting provisions, firewalls, and cowling.

3.11.2 Construction: This section shall be constructed of a titanium deck, firewalls, and cowling of aluminum and/or honeycomb reinforced fiberglass in accordance with HIAD.

3.11.3 Firewalls: Firewalls constructed of titanium and stainless steel shall consist of the horizontal deck under the engine, a vertical bulkhead at the engine inlet, and a shroud around the engine exhaust section. (15)

3.11.4 Cowling: The cowling shall enclose the engine and transmission sections and shall be of honeycomb reinforced fiberglass and/or aluminum alloy construction. The cowling shall have hinged cowl panels which shall provide easy access for inspection and servicing of engine, transmission and drive shaft. The left and right forward panels shall be hinged on the forward side and open to expose the transmission and pylon support area and the engine inlet.

3.11.4 Cowling: (Continued)
The left and right rear panels shall be hinged on the aft side and open to provide access to the engine compartment, fuel control and accessories.

3.11.5 Drainage: Drainage provisions in accordance with the HIAD shall be incorporated in the engine section to prevent the retention of fuel, oil or trapped water.

3.11.6 Access for Inspection and Maintenance: Access doors shall be provided for normal inspection and maintenance without requiring disassembly of major structural components or removal of the engine.

3.11.7 Fume-Tight Bulkhead: Fume-tight bulkheads shall be provided in accordance with the HIAD.

3.12 Propulsion Subsystem:

3.12.1 General Description and Components: The power plant installed in this aircraft shall consist of one horizontal mounted shaft turbine engine mounted above the aft portion of the fuselage and shall drive the transmission through a connecting shaft and freewheel unit. Flexible couplings shall be utilized on the shaft.

3.12.1.1 Infrared Radiation Suppression: Not applicable.

3.12.1.2 Engine Anti-Icing: A manually operated engine anti-icing system shall be provided.

3.12.1.3 RPM Limit Warning System: An rpm limit warning system with rpm limit detector in accordance with BHC Procurement Specification 205-075-388 shall be provided which shall furnish both audio and visual indication for low engine and rotor rpm, and visual indication for high rotor rpm to the pilot. Audio indication for low rpm shall be provided for the gunner. The low rpm switch, AUDIO-OFF, shall automatically reset when the rotor reaches normal rpm range.

3.12.2 Main Propulsion Unit:

3.12.2.1 Type: The engine installation shall consist of one Model T53-L-13A or T53-L-13B engine conforming to Lycoming Division of AVCO Manufacturing Corporation, Specification Number 104.33. The design shall be such as to accept the T53-L-13 engine installation as an alternate.

3.12.2.2 Installation: The engine shall be installed aft of the transmission on top of the fuselage and shall be enclosed in a suitable cowling. Reference HIAD, paragraph D.3-3.11.4.

3.12.2.2.1 Engine Mount: The engine shall be mounted in a horizontal position above the aft portion of the fuselage. The mount shall consist of built-up steel and/or titanium members and fittings in accordance with the HIAD.

3.12.2.2.2 Accessibility: The engine shall be removable from the aircraft by disconnecting the engine controls and piping, and removing the connecting shaft, cowling and engine mounting bolts. Quick disconnects are provided for electrical and fluid connections.

3.12.3 Auxiliary Propulsion Unit: Not applicable.

3.12.4 Engine Driven Accessories: The following accessories shall be driven by the engine:

Starter-Generator

Techometer Generator (Gas Producer)

Tachometer Generator (Power Turbine)

Fan, Oil Cooling, Compressor Bleed Air Driven

Environmental Control Unit, Compressor Bleed Air Driven

3.12.5 Air Induction System: The air induction system shall consist of recessed ramp type inlets in the engine cowl, a plenum chamber surrounding the engine inlet, a retractable engine air inlet screen, GFE Lycoming particle (16) separator, and GFE foreign object damage screen. A pressure sensing device shall be provided to warn the pilot and gunner of inlet, screen blockage. In the event that inlet screen blockage occurs, the inlet screen may be retracted allowing the incoming air to bypass the screen.

3.12.6 Exhaust System: The engine exhaust system shall be designed in accordance with HIAD and in addition, arranged to assure safe disposal of exhaust gases without existence of a fire hazard or carbon monoxide contamination of air in the crew compartment.

3.12.7 Cooling System: The engine cooling system shall be designed in accordance with HIAD. The engine section (17) shall be adequately cooled by airflow through the compartment and routing the flow of air to most efficiently cool the area.

3.12.8 Lubricating System: The lubricating system shall be in accordance with HIAD. In addition to provisions within the engine, the lubrication system shall consist of an oil tank, with sight glass level indication, self-locking drain valves for both oil tank and system drain, oil cooler, a thermal and pressure bypass valve, piping including vent line and connections. A pressure transmitter and indicator and a temperature indicator and bulb shall be provided. The lubrication system shall have a usable oil capacity of 3 quarts. For computation of oil capacity, the engine installation is not considered to be a turboprop engine installation.

3.12.8.1 Instruments: Oil pressure and oil temperature gages shall be installed for the engine. Indicating lights shall be provided on the caution panel to indicate low oil pressure at the oil outlet of the engine oil pump and emergency oil cooler bypass operation.

3.12.8.2 Filler: The oil filler shall be readily accessible through the right hand transmission cowl. The filler cap shall be in accordance with MIL-C-7244.

3.12.8.3 Tank: The oil tank shall be self-sealing construction in accordance with MIL-T-5579. Oil capacity in accordance with D.3-4.3.1.2 of the HIAD shall be provided for all mission requirements to include at least 25 percent expansion allowance:

(18) (19) (20) (21)

Total capacity 3.40 U.S. gallons
(including expansion space)

Useful capacity 2.25 U.S. gallons

3.12.8.4 Piping and Fittings: Piping shall be in accordance with Section D.1.4 of the HIAD and 3.19.6. AN or MS fittings shall be used in the system. Tapered pipe threads shall not be used in the installation except for permanent closures. (22)

3.12.8.5 Temperature and Surge Control: An oil cooler in accordance with MIL-C-25478 shall be provided. A temperature control and pressure relief valve shall be provided for the oil cooler. A cooling fan shall be provided to supply air to the engine oil cooler. The oil cooler fan shall be powered by engine bleed air.

3.12.8.6 Drainage Provisions: Drains shall be provided at the tank and the low point in the system to ensure the drainage of trapped oil when the aircraft is in normal attitude on the ground. All drains shall discharge clear of the aircraft structure and shall be clearly identified.

3.12.8.7 Deaeration Provisions: The engine oil tank shall be designed to deaerate the engine lubrication oil in accordance with the requirements of the HIAD, Paragraph D.3-4.2.4.1, except in bypass operation.

3.12.8.8 Bypass System: An automatic emergency oil cooler bypass system shall be provided, a cockpit warning light and a system activate switch. The bypass line shall be located on the opposite side of the aircraft from the standard oil supply and scavenge supply lines.

3.12.9 Fuel System:

3.12.9.1 Description and Components: The fuel system shall include a tank consisting of two interconnected crashworthy self-sealing fuel cells in accordance with BHC Procurement Specification 209-060-652. Each cell shall contain a submerged fuel pump. In addition, the fuel system shall include a shut-off valve, fuel quantity transmitters, an (23) indicator, drain valve in each cell, a 10-micron filter with impending bypass warning, fittings and connecting lines. The fuel system shall comply with HIAD. Fuel system components not covered by a specific specification shall be in accordance with MIL-F-8615. The engine shall be capable of suction feeding without boost pumps to an altitude of 6000 feet in accordance with the requirements of HIAD. The fuel system shall be compatible with fuels JP-4 and JP-5 conforming to MIL-J-5624 and 115/145 grade of fuel conforming to MIL-G-5572.

3.12.9.2 Pumps: An electric motor driven submerged fuel pump in accordance with MIL-P-5238 shall be provided in each cell.

3.12.9.3 Tank: The fuel tank shall consist of two interconnected self-sealing fuel cells located in the fuselage in the area aft of the pilot's cockpit and below the engine and pylon compartment. Refer to 3.19.5. The fuel cells shall conform to the following paragraphs of HIAD:

D.1-5.1.1, 5.1.2, 5.1.3, 5.2.1, 5.2.2, 5.2.4, 5.3.2.2, 5.3.3.1, 5.3.4a, 5.3.9, 5.4.3, 5.4.9 and 5.5;

D.2-5.2.1, 5.2.2 and 5.2.3

Total usable tank capacity 268.2 U.S. gallons (approx)

3.12.9.3.1 Tests: The fuel cells shall be tested in accordance with the applicable portions of MIL-T-5578.

3.12.9.4 Vent System: The fuel cells shall incorporate a single vent outlet of suitable design in accordance with the requirements of Paragraph D.2-5.3.6 of HIAD.

3.12.9.5 Piping and Fittings: Fuel system piping shall be in accordance with Section D.1-4 of the HIAD and Paragraph (22) 3.19.5. Fittings used in the system shall be AN or MS types. Tapered pipe threads shall not be used in the system except for permanent closures.

3.12.9.6 Valves: A single function motorized fuel shut-off valve shall be provided in general accordance with MIL-V-8608. The control for this valve shall be located convenient to the pilot.

3.12.9.7 Quantity Gages: A fuel quantity gage shall be (46) provided in accordance with BHC Procurement Specification 209-060-602. The gage installation shall meet the requirements of MIL-G-7940. The gage shall indicate in pounds.

3.12.9.8 Drainage Provisions: Provisions shall be made to drain the fuel tanks in accordance with requirements of HIAD.

3.12.9.9 Refueling Provisions: A closed circuit refueling receiver shall be provided in accordance with BHC Procurement Specification 209-060-651. Provisions for conventional refueling shall be retained.

3.12.9.10 Defueling Provisions: Drain valves conforming to MIL-V-25023 shall be installed at the lowest point in the system to provide for defueling. In addition to gravity defueling, the aircraft may also be defueled by use of the fuel pumps located in the fuel cells. The drains shall conform to paragraph D.2-5.4.5 of HIAD.

3.12.10 Water Injection System: Not applicable.

3.12.11 Propulsion System Controls:

3.12.11.1 Description and Components: The propulsion system controls shall consist of a twist-grip power control, starting switch, governor rpm control and engine power control unit. The switch-over from normal to emergency operation shall be initiated by a manually operated switch which actuates the solenoid-operated changeover valve. Means shall be provided to prevent starting of the engine with the fuel valve in the closed position.

3.12.11.2 Engine Control System:

3.12.11.2.1 Power Control Lever: The power control lever shall be actuated by a twist grip on the pilot's collective lever and the gunner's sidearm collective lever. (24)

3.12.11.2.2 Means to Control Maximum RPM: Means to remotely control the maximum rpm of the power turbine shall be by an electro-mechanical actuator located on the engine, which is controlled by a double throw, momentary switch. This switch is located on the collective lever at the pilot's station and on the side panel for the gunner's station.

3.12.11.3 Starter Control: The starter switch shall be located on the pilot's collective pitch control lever.

3.12.12 Starting System: A starter-generator shall be installed and shall be readily accessible for removal and servicing without removal of other components of the engine. Starting shall be accomplished by a 300 ampere electric starter-generator in accordance with BHC Procurement Specification 204-060-200. The starter-generator shall be powered by the aircraft battery. The starting system shall be capable of starting the engine between the ambient temperature limits of 0 to +115°F.

3.12.12.1 Auxiliary Starter: Auxiliary starting shall not be provided.

3.12.13 Propeller: Not applicable.

3.12.14 Rocket Propulsion: Not applicable.

3.12.15 Transmission System: The transmission system shall consist of a single stage bevel gear unit, a two-stage planetary gear system, and a tail rotor drive system. The (25) gear ratio between the engine and rotor is 20.383 to 1. The transmission shall include all parts used in the transmis- (26) sion of power from the engine to the tail rotor, through drive shaft assemblies, and to the main rotor, through the mast assembly. The transmission shall be in general accordance with the requirements of MIL-T-5955. A magnetic electric chip detector shall be located in each of the gearboxes.

3.12.15 Transmission System: (Continued)
A cockpit caution light shall indicate the presence of chips on any plug. A switch shall be provided to enable isolation of the caution signal to either the main transmission or the tail rotor gear boxes. Quick disconnects shall be used in all oil and electrical systems connections for major components.

3.12.15.1 Main Rotor Transmission System:

3.12.15.1.1 Bearings: Antifriction type bearings shall be installed at all required locations.

3.12.15.1.2 Piping and Fittings: Piping shall be in accordance with Section D.1-4 of the HIAD, except hose in accordance with MIL-H-25579 shall be used. AN or MS type fittings shall be used in the system. Tapered pipe threads shall not be used in the installation except for permanent closures.

3.12.15.1.3 Mounting: The transmission shall be mounted on suitable vibration isolators. A lift link shall be attached to the structure to carry thrust loads.

3.12.15.1.4 Instruments: The oil pressure transmitter and oil temperature sensing bulbs shall be installed on the transmission.

3.12.15.1.5 Freewheeling: A freewheeling unit shall be installed in the drive system. The unit shall be so arranged that the main rotor shall continue to drive the tail rotor with the engine disengaged.

3.12.15.1.6 Mast Assembly: The mast assembly shall transmit power from the transmission system to the main rotor. The mast shall be constructed of tubular alloy steel. The mast assembly shall be readily removable from the transmission to facilitate disassembly for maintenance in the field and packaging of spare transmissions.

3.12.15.1.7 Accessory Drives: The following accessory drives shall also be incorporated in the transmission assembly.

3.12.15.1.7.1 Hydraulic Pump: Two hydraulic pump drives in accordance with Drawing AND20001, Type XIB, shall be provided on the transmission assembly, suitable for driving the pumps which supply the hydraulic flight control cylinders.

3.12.15.1.7.2 Tachometer Generator Drive: A tachometer generator drive in accordance with Drawing AND20005, Type XVB, shall be provided for the main rotor and shall be installed on the transmission assembly. A suitable drive ratio shall be provided.

3.12.15.1.8 Bypass System: An automatic emergency oil cooler bypass system shall be provided with cockpit warning light and a system activate switch.

3.12.15.2 Antitorque (Tail) Rotor Transmission System: The tail rotor drive system shall consist of shaft assemblies, bearing hanger assemblies with flexible couplings, intermediate gear box, and tail rotor gear box.

3.12.15.2.1 Shaft Assemblies: Shaft assemblies shall include a forward shaft, three tail boom shafts, and a rear shaft. All shafts shall incorporate quick-disconnect couplings and shall be completely interchangeable.

3.12.15.2.2 Gearboxes:

3.12.15.2.2.1 Gearbox - Intermediate: The intermediate gearbox shall transmit power from the tail boom shafts to the rear shaft. An oil filler cap, magnetic electrical drain plug, oil level sight glass and interchangeable gear quills with flexible couplings shall be provided. Splash lubrication shall be employed.

3.12.15.2.2.2 Gearbox - 90 Degree: The 90 degree gearbox transmits power from the rear shaft to the tail rotor shaft. A sight gage for checking oil level, an oil filler cap with integral breather, a magnetic electrical drain plug, and interchangeable gear quills with a flexible coupling on the input shall be provided. Splash lubrication shall be employed. All bearings used shall be the same type as those used during qualification test; however, alternates may be used provided they are equivalent to the basic bearing.

3.12.15.2.2.2.1 Pitch Control: The tail rotor pitch control assembly shall be installed in the gearbox.

3.12.15.3 Transmission System Lubrication and Cooling:

3.12.15.3.1 Lubrication: The transmission lubrication system shall be integral with the transmission except for the oil cooler. The oil pump shall be immersed in the oil sump. A temperature and pressure relief valve shall be integral with the oil cooler. The transmission shall include an oil filter with replaceable element. (27)

3.12.15.3.2 Cooling: The transmission shall be cooled by conduction and supplemented by the transmission oil cooler which is cooled by the engine bleed air driven fan.

3.13 Secondary Power and Distribution Subsystems:

3.13.1 Electrical Power Generation and Distribution Subsystem:

3.13.1.1 Description: The electrical system shall be a 28 volt DC single conductor system with the generator negative lead grounded to the main structure. Power characteristics of the electrical system shall conform to the requirements of MIL-STD-704. Electrical equipment shall be installed in accordance with MIL-E-7080 and MIL-E-25499. The requirements of MIL-D-9402 shall be applicable for electrical equipment unless otherwise specified. A load analysis in accordance with MIL-E-7016 and MIL-E-7017 shall be provided. (28) (49)

3.13.1.1.1 Emergency Electrical System: The electrical system shall be a dual bus system supplied by the starter-generator and battery. There shall be an essential and non-essential bus. In the event of a starter-generator failure, the nonessential bus shall be automatically disconnected from the generator and battery bus and the battery shall automatically supply the essential bus loads. The emergency system shall be capable of supplying the essential bus loads for at least 30 minutes in the event of starter-generator failure with the following items on the essential bus (fully charged battery):

3.13.1.1.1 Emergency Electrical System: (Continued)

Force Trim
Stability Augmentation System
Oil Temperature for Engine and Transmission
Turn and Slip Indicator
Secondary Instruments Lights
Battery Relay
Primary Instrument Lights
Standby Inverter
One - Electrical Fuel Pump
Idle Stop Release Solenoid
AN/APX-72, IFF
Two - C-1611/AIC Intercom Panels
AN/ARC-51BX, UHF Xmtr

3.13.1.2 Electrical Power Supply.

3.13.1.2.1 Generator: One Government-furnished 300 ampere starter-generator in accordance with BHC Procurement (30) Specification 204-060-200 shall be installed on the engine. The contractor may install the ventilation system blower in the space provided for the auxiliary generator.

3.13.1.2.1.1 Regulator-Generator Voltage: A transistorized voltage regulator in accordance with BHC Drawing 209-075-228 with integral overvoltage sensing shall be provided for the starter-generator.

3.13.1.2.1.2 Relays: One MS24183D1 relay and one AN3025-300 relay shall be provided for the starter-generator.

3.13.1.2.2 Battery: Complete provisions for battery type BB-433/A and BB-649/A shall be installed at two separate locations defined by the center of gravity limitations imposed by the alternate weapons subsystem configurations. Battery type BB-649/A shall be installed in accordance with contractor-prepared USAECOM approved installation procedures. The installation shall be designed to utilize the battery connector, drainage, and venting facilities at either battery location.

3.13.1.2.2.1 Disconnect: A contractor-furnished USAECOM approved battery quick-disconnect connector, Type MS25182-2 or equivalent, shall be installed.

3.13.1.2.2.2 Markings: Both battery locations shall be identified.

3.13.1.2.2.3 Drainage - Venting: Suitable drainage and venting shall be provided.

3.13.1.3 Electrical Power Conversion:

3.13.1.3.1 Inverters: Inverter PU-543( )/A shall be installed and shall be the primary inverter. A contractor-furnished 150 VA single-phase static inverter shall be installed and be utilized to provide emergency AC electrical power. The contractor shall provide appropriate

3.13.1.3.1 Inverters: (Continued)

switching circuitry to transfer the aircraft AC electrical load from the primary inverter PU-543( )/A to the standby inverter. The inverter transfer switch functions shall be clearly identified and conveniently located for operation by the pilot.

3.13.1.3.1.1 Relay: One AC failure relay shall be installed.

3.13.1.4 Equipment Installation: The equipment shall be installed in accordance with 3.13.1.1 and as noted herein.

3.13.1.5 Wiring: The requirements of MIL-W-5088 shall (31) be applicable for cable and wiring installations. Wiring conforming to MIL-W-16878 may be used in specific applications as necessary.

3.13.1.6 Bonding and Shielding: Electrical bonding shall be in accordance with MIL-B-5087. In addition, shielding and conduit shall be provided where necessary.

3.13.1.7 Controls:

(32 33 34 35) 3.13.1.7.1 Panel: Console mounted control panels shall be in general accordance with MIL-C-6781.

3.13.1.7.2 Switches: Approved type switches shall be provided where applicable.

3.13.1.7.2.1 Guards: Guards shall be provided as required by the procuring agency.

3.13.1.7.2.2 Jettison Controls: Primary selective electrical jettison controls shall be provided for the pilot. Emergency salvo electrical jettisoning controls shall be provided for both the pilot and gunner which will permit jettison of wing stores. The controls shall be located on the left side of each cockpit, adjacent to the collective pitch lever in accordance with HIAD, paragraph C.2-2.7.4.

3.13.1.7.3 Circuit Breakers: Approved type trip-free circuit breakers shall be provided.

3.13.1.7.4 Rheostats and Resistors:

3.13.1.7.4.1 Rheostats: Approved type rheostats shall be provided as required.

3.13.1.7.4.2 Resistors: Approved type resistors shall be provided as required.

3.13.1.7.5 Motors: Approved type motors in accordance with MIL-M-8609 shall be provided.

(36) 3.13.1.8 Lighting: The requirements of MIL-L-6503 (insofar as rotary wing aircraft are concerned) and the (37) below paragraphs, shall be applicable for the aircraft lighting.

3.13.1.8.1 Instrument and Console Lights: Instrument panel eyebrow lights, Type I of MIL-L-5057 (paragraphs 3.4.1.1, 3.4.6.1, 3.4.7, 3.7, and 3.8), or post lights with dimming control shall be provided for the instrument (50) panels. Console light shall be in accordance with Paragraph 3.3.4.1 of MIL-L-6503. Instrument lighting shall be provided in accordance with MIL-L-5667 except that secondary lighting shall be provided by the cockpit compartment lights specified in 3.13.1.8.2.

3.13.1.8.2 Cockpit Compartment Lights: Three adjustable Grimes 15-007-43, cockpit lights shall be installed.

3.13.1.8.3 Navigation Lights: Navigation lights shall be provided in accordance with the requirements of paragraphs 3.3.11 and 3.3.13 of MIL-L-6503. (Note: This requirement eliminates fuselage lights).

3.13.1.8.4 Landing Lights: Not required.

3.13.1.8.5 Anticollision Lights: A Government-furnished anticollision light shall be installed. The installation shall be in accordance with MIL-L-6503 or MIL-L-58085.

3.13.1.8.6 Searchlight: One Government-furnished searchlight, FSN6220-283-9767, shall be installed.

3.13.1.9 Ignition and Starting System: The ignition system shall be a high energy medium voltage capacitor discharge system with associated lightweight shielded ignition harness of a type specified by the engine manufacturer. The ignition and starting systems shall be activated simultaneously by a trigger-type switch on the lower side of the collective pitch lever switch box at the pilot's station only.

3.13.1.10 Receptacles:

3.13.1.10.1 External Power: One AN2552-3A external power receptacle shall be provided.

3.13.1.10.2 Connector: MS connectors in accordance with MIL-C-5015 and MIL-C-26482 shall be provided where necessary.

3.13.1.10.3 Fuel Nozzle Ground Receptacle: One (45) AN3117-1 fuel nozzle ground receptacle shall be provided and installed by the contractor not closer than 10 inches nor farther than 42 inches from the fuel filler neck.

3.13.1.10.4 Receptacle for Engine Vibration Check Equipment: A receptacle shall be provided on gunner's left hand console. This receptacle will provide an outlet for plug-in installation of the Lycoming engine vibration check equipment.

3.13.1.11 Indicators:

3.13.1.11.1 Volt-Ammeter: One combination volt-ammeter, Weston Model 832 or equivalent, shall be provided. The meter shall indicate generator current and essential bus voltage.

3.13.1.12 Electric Drives: Electric actuators shall be provided for rpm control, bleed-air control, and heater control.

3.13.1.13 Relays: MS type relays or equivalent shall be provided by the contractor.

3.13.1.14 Electromagnetic Compatibility (EMC): The contractor shall comply with the requirements of MIL-E-6051 as defined in the contractor's Electromagnetic Compatibility Control Plan as approved by the procuring agency.

3.13.2 Hydraulic Power Generation and Distribution Subsystem:

3.13.2.1 Description and Components: A dual hydraulic control system shall be provided for the cyclic and collective controls with the directional controls powered by a single servo cylinder. The hydraulic system shall be in accordance with MIL-H-5440 and shall consist of two variable delivery hydraulic pumps, two reservoirs, relief (41) valves, shut-off valves, pressure warning lights, lines, filters, fittings, and manual dual tandem servo actuators (51) incorporating irreversible valves. Hose shall be in accordance with MIL-H-25579. The dual hydraulic system shall be separated as defined in 3.19.8. Protective boots shall be provided to protect the hydraulic power cylinders from dirt and oil.

3.13.2.2 Summary of Actuated Items: The following items shall be actuated by the hydraulic systems:

System No. 1

Cyclic and Collective Controls
Tail Rotor Controls
Yaw Axis Automatic Stabilization Equipment

System No. 2

Cyclic and Collective Controls
Armament System
Pitch and Roll Automatic Stabilization Equipment

3.13.2.3 Hydraulic Pumps: Each system shall have its own variable displacement pump. Both pumps shall be driven by the main transmission. The hydraulic pumps shall be in accordance with BHC Procurement Specification 204-076-006.

3.13.2.4 Hydraulic Servo Cylinder: A tandem power cylinder incorporating closed center four-way manual servo valves and irreversible valves shall be provided in the lateral and fore-and-aft cyclic and collective control systems. A single power cylinder incorporating a closed

3.13.2.4 Hydraulic Servo Cylinder: (Continued) center four-way manual servo valve shall be provided in the directional control system. The cylinders shall contain a straight through mechanical linkage. The tandem power cylinder shall conform to BHC Procurement Specification 204-076-003 and the single power cylinder shall conform to BHC Procurement Specification 204-076-053.

3.13.2.5 Reservoirs: Two reservoirs, one for each system, shall be provided. Reservoirs shall be nonpressurized and in accordance with MIL-R-5520. The reservoirs shall be easily accessible for ground check out and servicing.

3.13.2.6 Modular Component Assembly: A modular component assembly which contains a pressure line filter, return line filter, differential pressure indicators to indicate when the filters should be changed, relief valve, pressure switch, and an electrically operated shut-off valve shall be provided for each system. Filter elements shall be in accordance with BHC Procurement Specification 205-076-034.

3.13.2.7 Piping and Fittings: Fittings and tubing shall conform to Military Standard Drawings for flareless fittings.

3.14 Utilities and Equipment Subsystem:

3.14.1 Environmental Control System: Engine bleed air shall be used to provide crew comfort as described in 3.7.1.3.11.

3.14.1.1 Valves and Controls: The environmental control system shall include the necessary valves and controls to provide conditioned air through the distribution system.

3.14.1.2 Distribution System: The distribution system shall consist of a system of ducts that convey conditioned air to the cabin and transparent areas.

3.14.1.3 Outlets: The distribution system shall include suitable outlets to provide convenient cabin air flow control.

3.15 Mission and Air Traffic Control Subsystems:

3.15.1 Description: The mission and air traffic control subsystems shall include communication and navigation radios, intercommunication systems and identification systems.

3.15.1.1 Electronic Equipment: All electronic equipment shall be located for ease in servicing and maintenance. The contractor shall use contractor-furnished, flush-mounted antennas, where practicable. All contractor-furnished electronics equipment shall conform to MIL-E-5400, MIL-T-5422, and MIL-I-6181. Electronic equipment shall be installed and tested in accordance with the requirements of MIL-I-8700. The contractor shall resolve to the satisfaction of the procuring agency any unsatisfactory performance of electronic equipment resulting from revolution of the rotor, whether of an electrical or mechanical nature. The antennas shall be installed in accordance with MIL-A-7772 with the exception of paragraphs 3.3.1 and 3.3.6, which shall not be applicable. An avionics test specification conforming to the intent of the U.S. Army Electronics Command Specification (SCL-T) listed in the following paragraphs shall be submitted to the procuring agency for approval.

3.15.1.1.1 Avionic Control Configuration: One C-1611( )/AIC intercommunications control and the C-7197/ARC-134 VHF control for the AN/ARC-134 VHF Radio shall be installed in the gunner's compartment. All other avionic equipment controls shall be installed in the pilot's compartment.

3.15.2 Communication Subsystems:

3.15.2.1 Command Set: The command set shall be a UHF Radio Set, Type AN/ARC-51BX, consisting of the following equipment:

Receiver-Transmitter	RT-742( )/ARC-51BX
Mounting	MT-2653( )/ARC
Control	C-6287( )/ARC-51BX
Cooler	HD-615( )/ARC-51X
Indicator	ID-1003( )/ARC

3.15.2.1.1 Installation and Test: The AN/ARC-51BX shall be installed in accordance with SCL-I-0020 and tested in accordance with SCL-T-0020 as defined in the contractor's avionics test specification. The AN/ARC-51BX shall utilize position Number 2 of control C-1611( )/AIC.

3.15.2.1.2 Antenna AT-1108( )/ARC: The AT-1108( )/ARC Antenna shall be utilized by the AN/ARC-51BX, and AN/ARC-134 installations.

3.15.2.1.2.1 Installation: Antenna AT-1108( )/ARC shall be installed so that the UHF element is utilized by the AN/ARC-51BX and the VHF element is utilized by the AN/ARC-134 installation.

3.15.2.2 Tactical Communication Set: The tactical communication set shall be an FM Radio Set, Type AN/ARC-54 or AN/ARC-131 consisting of the following equipment:

Receiver-Transmitter	RT-348( )/ARC-54
Mounting	MT-1535( )/ARC-54
Control	C-3835( )/ARC-54
Antenna, Homing, FM	209-075-292
Kit, Connector	5935-695-4914
Antenna, Communication, FM	AS-2285/ARC

or

Receiver-Transmitter, Radio	RT-823( )/ARC-131
Mounting	MT-3664( )/ARC-131
Control Unit, FM	C-7088( )/ARC-131
Antenna, Homing, FM	209-075-292
Kit, Connector	FSN 5935-695-4915 MX-709299-801
Antenna, Communication, FM	AS-2285/ARC

3.15.2.2.1 Installation and Test:

3.15.2.2.1.1 AN/ARC-54 FM Radio Set: The AN/ARC-54 shall be installed in accordance with SCL-I-0019 and tested in accordance with SCL-T-0019 as defined in the contractor's avionics test specification. The AN/ARC-54 shall utilize position Number 1 of the C-1611( )/AIC intercommunication control.

3.15.2.2.1.2 AN/ARC-131 FM Radio Set: Except for the wiring harness, the AN/ARC-131 shall be installed in accordance with SCL-I-0055 and tested in accordance with SCL-T-0055, as defined in the contractor's avionics test specification. The AN/ARC-131 shall utilize the AN/ARC-54 wiring harness which shall be installed in accordance with USAECOM Drawing ES-C-200323. The AN/ARC-131 shall utilize position Number 1 of Control C-1611( )/AIC.

3.15.2.2.2 Homing Antenna: The homing antenna, which shall be utilized by the receiver portion of the AN/ARC-54 or AN/ARC-131 radio shall be furnished by the contractor and shall perform in accordance with SCL-T-0019 as defined in the contractor's avionics test specification.

3.15.2.2.3 Presentation: The homing information from the AN/ARC-54 or AN/ARC-131 FM Homer shall be presented to the ID-48( )/ARN indicator.

3.15.2.2.4 Communication Antenna: The AS-2285/ARC communication antenna which shall be utilized by the AN/ARC-54 or AN/ARC-131, shall be in general accordance with MIL-A-9410 amended to reflect an operational range of 30 to 70 megahertz in lieu of the specified 24 to 52 megacycles per second.

3.15.2.3 Intercommunication System: The intercommunication system shall consist of two C-1611( )/AIC intercommunication controls, one each for pilot and gunner. The control panels shall be installed to provide hot-mic operation in the PVT position. The two panels shall be wired for full transmit and receive function. Two external interphone jacks shall be provided in the wings and shall be readily accessible to ground personnel. Two extension cords for use with the H-101( )/U headset shall be supplied as loose equipment and shall not be considered as part of weight empty.

3.15.2.3.1 Installation and Test: The intercommunication system shall be installed in accordance with SCL-I-0004 and tested in accordance with SCL-T-0004 as defined in the contractor's avionics test specification.

3.15.2.3.2 Description Placards: The contractor shall provide and install description placards showing all available functions at the two C-1611( )/AIC intercommunication stations. The placards shall be in accordance with MIL-M-13231 and MIL-D-8634.

3.15.2.4 VHF Radio Set: The VHF radio set shall be an AN/ARC-134 consisting of the following equipment:

Receiver-Transmitter	RT-857/ARC-134
Mounting	MT-3791B/ARC-134
Control	C-7197/ARC-134

3.15.2.4.1 Installation and Test: The AN/ARC-134 shall be installed in accordance with SCL-I-0053 and USAECOM Drawing ES-D-199084 and tested in accordance with SCL-T-0053 as defined in the contractor's avionics test specification. The AN/ARC-134 shall utilize position Number 3 of control C-1611( )/AIC.

3.15.2.5 Microphone and Headset Provisions: Provisions consisting of one each WF-14/U headset-microphone cord and U-92A/U plug shall be installed for the pilot and gunner.

3.15.2.5.1 Normal Keying Provisions: Normal microphone keying switches shall be provided on the cyclic control sticks, and in addition the contractor shall provide one MIL-S-8805 or equivalent press-to-talk switch in a suitable location to be readily operable by the gunner. The switch location shall also be compatible with the location of the foot rests.

3.15.2.6 Provisions:

3.15.2.6.1 Communications Security Set: Complete provisions shall be provided for the Communications Security Set TSEC/KY-28. The provisions shall include the following Government-furnished contractor-installed equipment:

Control	C-8157/ARC
Mounting	MT-3802/ARC
Discrete Signal Discriminator	MD-736/A

3.15.2.6.1.1 Installation and Test: Communications Security Set TSEC/KY-28 provisions, Control Indicator Assembly C-8157/ARC, Mounting MT-3802/ARC, and Discrete Signal Discriminator MD-736/A shall be installed in accordance with USAECOM Drawings ES-C-200323, ES-C-210304, ES-F-200364, ES-D-201221, and ES-F-199850. Suitable circuitry shall be provided for a secure mode indicator in full view of the gunner. Visual warning shall indicate secure mode operation by the pilot.

3.15.2.6.1.2 Test Requirements: Functional and tempest testing, in accordance with the contractor's tempest test plan, shall be accomplished by Bell Helicopter Company personnel.

3.15.3 Navigation Subsystems:

3.15.3.1 Direction Finder Set: The radio compass shall be AN/ARN-83 consisting of the following equipment:

Receiver	R-1391/ARN-83
Control	C-6899/ARN-83
Mounting	MT-3605/ARN-83
Antenna, Loop	522-3558-001
Antenna, Sense	209-030-133

3.15.3.1.1 Presentation: The navigation information from the ADF system shall be presented on Needle Number 1 of the ID-998( )ASN indicator through the ADF/VOR switch and on Needle Number 1 of the ID-250/ARN indicator. Needle Number 2 of each indicator shall be electrically connected to Needle Number 1.

3.15.3.1.2 Installation and Test: The AN/ARN-83 shall be installed in accordance with SCL-I-0034 and tested in accordance with SCL-T-0034 as defined in the contractor's avionics test specification. Contractor-furnished flush sense antenna and flush loop antenna shall be provided.

3.15.3.1.3 Error Compensation: The contractor shall furnish a suitable quadrantal error corrector for the loop antenna.

3.15.3.2 Gyrosyn Compass: The Gyrosyn Compass system shall be an AN/ASN-43( ) consisting of the following equipment:

Transmitter-Remote Compass (with single cycle error compensator CN-405( )/ASN)	T-611( )/ASN
Gyro, Directional Electrically Driven	CN-998( )/ASN-43
Indicator, Course (Pilot)	ID-998( )/ASN
Indicator, Course (Gunner)	ID-250/ARN
Amplifier, Electrical Control	AM-3209( )/ASN

3.15.3.2.1 Installation and Test: The gyrosyn compass shall be installed in accordance with SCL-I-0026, and tested in accordance with SCL-T-0026 as defined in the contractor's avionics test specification. Compass swinging shall be in accordance with MIL-STD-765.

3.15.4 Identification Subsystems:

3.15.4.1 Transponder Set Installation: The IFF transponder shall be an AN/APX-72 consisting of the following equipment:

Receiver-Transmitter	RT-859/APX-72
Mounting	MT-3809/APX-72
Control	C-6280(P)/APX
Antenna	AT-884( )/APX-44

3.15.4.1.1 Installation and Test: The AN/APX-72 shall be installed in accordance with SCL-I-0051, DOD Drawing X66D1500, USAECOM Drawings ES-C-171380 and ES-J-187150, and USAF Drawing X64C927 and X65C1689 and tested in accordance with SCL-T-0051 as defined in the contractor's avionics test specification.

3.15.4.2 Auxiliary Equipment Provisions: Complete provisions shall be provided for the following equipment, with the exception of the mount for the Mark XII Computer which shall be installed.

*Transponder Test Set	TS-1843( )/APX
*Mark XII Computer	KIT-1A/TSEC
**Mount	MT-3949A/U

*Complete Provisions Only
**Installed Equipment

3.15.4.2.1 Installation and Test: Auxiliary equipment shall be installed in accordance with SCL-I-0051 and USAECOM Drawing ES-D-217493 and tested in accordance with SCL-T-0051 as defined in the contractor's avionics test specification.

3.16 Reconnaissance Subsystem: Not applicable.

3.17 Fire Control System:

3.17.1 Description: The fire control system for the pilot and gunner shall be as described in U.S. Army Draft Technical Characteristics for the XM-28 Armament Subsystem, dated 24 July 1970. The following equipment shall be installed:

3.17.2 Gunner's Sight: A GFAE gunner's sight shall be installed as part of the XM-28 Armament Subsystem. The sight mounting shall permit the gunner to move the sight about the cockpit area to the extent necessary for target acquisition and tracking throughout the azimuth and elevation limits of the turret.

3.17.3 Pilot's Sight: A GFAE pilot's sight (XM-73) shall be installed as part of the XM-28 Armament Subsystem.

3.17.4 Gunner's Controls: A GFAE gunner's control panel shall be installed as part of the XM-28 Armament Subsystem. The gunner shall have the capability to fire weapons from the cyclic control.

3.17.4.1 Gunner's Fire Restrictions: The gunner shall not be capable of firing any weapons simultaneously, except for two identical weapons firing from the turret. The gunner shall not be capable of interrupting fire initiated by the pilot except when the gunner's OVERRIDE PILOT switch is in the ON position.

3.17.4.2 Automatic Controls: When the gunner's action switch is released, the turret shall automatically return to the forward stow position. If the pilot takes control of the weapons, the turret shall return to stow position.

3.17.5 Gunner's Indicators: Indicators shall be provided as part of the GFAE gunner's control panel.

3.17.6 Pilot's Controls: A GFAE rocket control and display system shall be installed. The pilot shall have the capability of selection of any of four different types of rockets which have been loaded. Ripples of one, two, four, eight, or all of, either single or pairs, may be selected and fired. In addition, the pilot shall have the capability of selecting and firing any weapon or weapons carried on the external stores stations. The pilot can select the rate of fire of 7.62mm (turret gun(s)) through a firing switch on the cyclic stick. In addition, a separate firing switch shall be provided on the cyclic stick for the wing stores.

3.17.6.1 Pilot's Fire Restrictions: The pilot shall not be capable of firing any weapons simultaneously except for two identical weapons firing from the turret or identical weapons fired from the wing stations. The pilot shall not be capable of firing weapons when the gunner's OVERRIDE PILOT switch is in the ON position.

3.17.7 Pilot's Indicators: Indicators shall be provided as part of the GFAE pilot's control panels. The indicators shall be a complete digital readout of remaining rockets.

3.18 Armament Subsystems: The armament subsystems shall be as described in the following paragraphs and U.S. Army draft "Technical Characteristics for the XM-28 Armament Subsystem". The aircraft shall be capable of carrying and firing various combinations of these weapons within the aircraft weight and center of gravity limitations with adjustments in expendable load.

3.18.1 7.62mm/40mm Turret: A GFAE turret shall be installed as part of the XM-28 Armament Subsystem. The turret shall be chin mounted. The aircraft ammunition compartment shall be capable of accepting the GFAE ammunition containers with the following quantities of ammunition:

One 7.62mm gun and one 40mm gun		4000 rounds linked 7.62mm plus 231 rounds linked 40mm
Two 7.62mm guns	-	8000 rounds linked 7.62mm
Two 40mm guns	-	462 rounds linked 40mm

The ammunition compartment and surrounding areas should be adequately sealed to prevent accumulation of gun gases above 75 percent of the lower explosive limit.

3.18.2 2.75 Inch Folding Fin Aerial Rocket: The aircraft shall be capable of carrying the 19-tube XM-159 rocket launcher (or equivalent) and the seven tube XM-157 rocket launcher (or equivalent). Two GFAE intervalometer programmer assemblies shall be installed, one for the left hand wing rocket stations and one for the right hand wing rocket stations. The two intervalometer programer assemblies will permit selective single or ripple fire of the rockets, and switch-over from inboard to outboard, or vice versa, without loss of memory.

3.18.3 7.62mm Pod: The 7.62mm pod shall be the XM-18 using the XM-134 high rate gun and carrying 1500 rounds of linkless ammunition.

3.18.4 Stores Pylons: The aircraft shall be provided with two inboard and two outboard wing station pylons, for

3.18.4 Stores Pylons: (Continued)

carrying external stores. The outboard pylons shall be capable of carrying and safely jettisoning the following:

a.	Seven tube 2.75-inch rocket pods (XM-157)	- Seven FFAR 10- or 17-pound warhead rockets
b.	Seven tube 2.75-inch rocket pods (XM-157)	- empty
c.	Nineteen tube 2.75-inch rocket pods (XM-159)	- nineteen FFAR 10-pound warhead rockets
d.	Nineteen tube 2.75-inch rocket pods (XM-159)	- twelve FFAR 17-pound warhead rockets
e.	Nineteen tube 2.75-inch rocket pods (XM-159)	- empty

The inboard pylons shall be capable of carrying and safely jettisoning the following:

f.	XM-18 pods	- 1500 rounds of 7.62mm linkless ammunition
g.	XM-18 pods	- empty
h.	Seven tube 2.75-inch rocket pods (XM-157)	- seven FFAR 10- or 17-pound warhead rockets
i.	Seven tube 2.75-inch rocket pods (XM-157)	- empty
j.	Nineteen tube 2.75-inch rocket pods (XM-159)	- nineteen FFAR 10- or 17-pound warhead rockets
k.	Nineteen tube 2.75-inch rocket pods (XM-159)	- empty

Provisions shall be included in all pylons for ground settable elevation adjustment of the stores. The maximum elevation adjustment shall be limited to provide adequate projectile clearance with the main rotor at its lowest point as established by flight test.

XM 158 & XM 200 take place of XM 159 & XM 157 per B. Jones Syo. Eng.

3.18.5 Target Marking. A wing-mounted smoke grenade dispenser system in accordance with BHC Procurement Specification 209-071-081, shall be provided which will hold 24 smoke grenades to be used for target marking. The installation shall enable the pilot to eject one grenade at a time or up to four grenades of different colors simultaneously. A positive release indication shall be provided. The smoke grenade fire switch shall be located on the pilot's collective stick switch box.

3.18.5.1 Target Marking (Rocket): The rocket control and display system shall provide the capability of stand-off target marking utilizing the 2.75-inch rockets.

3.18.6 Fuse Setter System: A Government-furnished capacitor fuse setter system for the 2.75-inch rockets shall be installed.

3.18.7 Aircraft Armament Interference: The armament installation shall be designed so that frangible rocket pod fairings, rocket debris, ejected cartridges, cases, and links shall not endanger or damage the aircraft or external stores. Adequate clearance shall be provided between projectiles and all parts of the aircraft or external stores. Adequate safety provisions shall be incorporated to preclude collision of projectiles in near proximity of the aircraft. The armament installation shall be designed so that weapon blast and noise have no significant detrimental effect on the crew, aircraft, other weapons, or performance of the mission.

3.18.8 Alternate Configuration:

3.18.8.1 Hog Configurations:

3.18.8.1.1 Hog Configuration No. 1: Hog configuration No. 1 shall consist of four faired XM-159B rocket launchers with nineteen 2.75-inch FFAR 10-pound warhead rockets in each launcher. The XM-28 ammunition shall be reduced to 6000 rounds of 7.62mm in this configuration.

3.18.8.1.2 Hog Configuration No. 2: Hog configuration No. 2 shall consist of four faired 132-pound XM-159C rocket launchers with nineteen 2.75-inch FFAR 17-pound warhead rockets in both inboard launchers and twelve 2.75-inch FFAR 17-pound warhead rockets in both outboard launchers. The XM-28 ammunition shall be reduced to 6000 rounds of 7.62mm in this configuration.

3.18.8.2 Scout Configurations:

3.18.8.2.1 Scout Configuration No. 1: Scout configuration No. 1 shall consist of two faired XM-157A rocket launchers with seven 2.75-inch FFAR 10-pound warhead rockets in each launcher and two XM-18 minigun pods with 1500 rounds of ammunition in each pod.

3.18.8.2.2 Scout Configuration No. 2: Scout configuration No. 2 shall consist of two faired XM-157B rocket launchers with seven 2.75 inch FFAR 17-pound warhead rockets in each launcher and two XM-18 minigun pods with 1500 rounds of ammunition in each pod.

3.18.8.3 XM-35 20mm Weapon Subsystem: By installing the XM-35 Armament Provisions Kit described in 3.26, complete provisions may be provided for installation of the XM-35 20mm weapon subsystem.

3.19 Passive Defensive Subsystems:

3.19.1 Description, Components, and Performance Requirements: The passive defense subsystem shall consist of protective armor, fire suppression, and leak preventative means which shall be installed to enchance crew and system survivability. The performance requirements of the protective material shall be as follows:

3.19.1.1 Opaque Armor Material: The opaque armor material used shall conform to MIL-S-46099 or MIL-A-46103.

3.19.2 Chest and Torso Protection: Both the gunner and pilot will be required to wear a chest and torso protector similar to FSN 8470-NTK-5601 with carrier, which will be GFAE. Design of the basic seat and side panels will take into consideration the amount of protection afforded by this protector.

3.19.3 Protective Seats: Protective seats shall be provided for both the gunner and pilot. The basic seats shall consist of the seat bottom, sides, and back. Additional protection shall be provided by side-shoulder panels and head protection panels which may be easily installed and removed. The protective material to be employed in the basic seats and side panels shall be constructed of the material specified in 3.19.1.1. The seats shall be designed to give an equivalent or greater protection to the air crew than the present UH-1B/D armored seat, FSN 1680-941-8741. Refer to 3.7.1.3.9.1 for seat strength requirements.

3.19.4 Power Plant: The engine compressor, fuel control, oil filter and fuel filter shall be protected to the greatest extent possible utilizing armor material in accordance with 3.19.1.1.

3.19.5 Fuel System: Self-sealing fuel cells shall be provided and protected to the following levels:

Bottom 33 percent capacity - .50 caliber

Center 33 percent capacity - .30 caliber

The remaining capacity shall be tear resistant

Fuel cell interconnect line shall be in accordance with BHC Drawing 209-060-653.

3.19.6 Engine Oil System: The engine oil system shall include an automatic emergency oil cooler bypass system in accordance with 3.12.8.8.

3.19.7 Transmission: The transmission oil system shall include an automatic emergency oil cooler bypass system in accordance with 3.12.15.1.8.

3.19.8 Hydraulic System: The dual hydraulic system shall be physically separated to reduce the probability of a single round incapacitating both systems. The pressure and return lines from each pump shall be routed in a different direction to provide maximum separation. The hydraulic reservoirs and modular components assemblies shall be mounted on opposite sides of the aircraft. An accumulator, check valve and pressure operated shut-off valve will be installed in System Number 1. Hydraulic lines to the cyclic and collective servo actuators shall be separated, by system, everywhere except at the connector on the servo valve. The hydraulic lines to the tail rotor control servo and stability augmentation equipment shall be separated from hydraulic lines to the armament system at all locations.

3.19.9 Flight Controls: Wherever possible, the pilot's cyclic and collective primary flight control push-pull tubes shall be a minimum of 1.25 inches in diameter.

3.20 Ground Handling and Servicing Provisions:

3.20.1 Towing Provisions: Complete provisions for attachment of towing and ground handling kit shall be provided (Refer to 3.26.1). Towing provisions shall conform to MIL-T-7935.

3.20.2 Jacking Provisions: Four jacking points shall be provided in accordance with the applicable portions of MIL-J-8711.

3.20.3 Mooring Provisions: Mooring provisions shall comply with the requirements of ANC-2, chapter 4, paragraph 4.5.

3.20.3.1 Skid Gear: The skid tubes may be used as mooring points.

3.20.3.2 Fuselage and Wing: Tie-down fittings shall be provided at suitable points on the fuselage and wings for mooring. A suitable decal shall be affixed to the aircraft citing restraint values of tie-down points.

3.20.3.3 Rotors: A tie-down device securing the main and tail rotor blades shall be provided.

3.20.4 Hoisting Provisions: Provisions shall be made for hoisting the aircraft from the top of the mast.

3.20.5 Leveling: Leveling provisions shall consist of a jig located fore and aft and lateral lugs for use with an inclinometer or spirit level.

3.20.6 Special Support Equipment: Special support equipment required for the aircraft shall be designed in accordance with MIL-S-8512.

3.20.7 Covers: Covers shall be provided in accordance with MIL-C-5778 for the following components.

Canopy Cover
Turbine Exhaust
Turbine Air Inlet
Pitot Static

3.20.8 Tie-down Provisions: Provisions for attachment of a ground tie-down cable shall be incorporated on the lift beam.

3.21 Flight and Propulsion Instrument Subsystems:

3.21.1 Description and Components: Flight, navigation and power plant instruments for use by the pilot and gunner shall be plainly visible from their stations with minimum practicable deviation from normal position and line of vision when looking out and forward along the flight path. The pilot's instruments shall be installed substantially in accordance with the Army Standard "T" Panel Arrangement. The gunner's instrument panel shall contain only essential instruments and shall present minimum information for flight to return from a mission once instigated, and for emergency use. Operating limits shall be indicated on the instrument glass.

3.21.1.1 Flight Instruments: The following flight instruments shall be installed:

Pilot's

Indicator, Airspeed
*Indicator, Attitude
Indicator, Altimeter
Indicator, Vertical Speed
Indicator, Turn and Bank

Gunner's

Indicator, Airspeed
Indicator, Altimeter
*Indicator, Attitude with Ball

*Remote gyro with 3-inch repeater indicators for the pilot and gunner.

3.21.1.2 Propulsion Instruments: The following propulsion instruments shall be installed:

Pilot's

Tachometer, Dual, Rotor and Free Turbine
Torque Meter
Fuel Pressure
Fuel Quantity
Exhaust Gas Temperature
Tachometer, Gas Producer
Engine Oil Pressure
Engine Oil Temperature
Transmission Oil Pressure
Transmission Oil Temperature

Gunner's

Exhaust Gas Temperature
Tachometer, Dual, Rotor and Free Turbine
Torque Meter
Tachometer, Gas Producer

3.21.1.3 Navigation Instruments: The following navigation instruments shall be installed:

Pilot's

Indicator, Heading, ADF
Indicator, FM Homing

Gunner's

Indicator, Heading, ADF
(Repeating sense information from pilot's system)

The following instrument shall be mounted on the left windshield/canopy support where it may be utilized by both the pilot and gunner.

Standby Magnetic Compass

3.21.1.4 Additional Instruments: In addition to flight and propulsion instruments, the following instruments shall be installed:

Pilot's

Load Meter/Volt Meter
Clock
Outside Air Temperature Gauge

Gunner's

Rounds Remaining Counter

3.21.1.5 Caution Panel: Word warning caution panels shall be provided for the pilot and gunner. The caution panels shall be in accordance with Section C.2-2.10-3 of the HIAD and MIL-STD-411. The caution panels shall indicate the following:

Pilot's

Low Engine Oil Pressure
Engine Air Filter Blocked
Forward Fuel Boost Pump Off
Aft Fuel Boost Pump Off

3.21.1.5 Caution Panel: (Continued)

Pilot's (Continued)

Engine, Fuel Pump Inoperative
Fuel Filter Bypass
Governor Emergency
Fuel Low Quantity
Low Transmission Oil Pressure
High Transmission Oil Temperature
Low Hydraulic Pressure System No. 1
Low Hydraulic Pressure System No. 2
AC Inverter Failure
DC Generator
External Power Plug In
*Chip Detector
Engine Oil Bypass
Transmission Oil Bypass
IFF Transponder Malfunction

Gunner's

Engine Air Filter Blocked
Low Engine Oil Pressure
Engine Fuel Pump Inoperative
Fuel Filter Bypass
Low Transmission Oil Pressure
High Transmission Oil Temperature
*Chip Detector
Governor Emergency
Low Hydraulic Pressure System No. 1
Low Hydraulic Pressure System No. 2
DC Generator
Fuel Low Quantity

*The chip detector warning light presents chip indications from the transmission, engine, and both gear boxes. The pilot may isolate the indication by means of a push-to-indicate switch.

3.21.1.6 Warning Indicators: The following warning lights shall be provided:

Pilot's

Master Caution Light (Yellow)
High-Low RPM Warning Light (Red)
Fire Warning Light (Red)

Gunner's

Fire Warning Light (Red)

(39) (52) 3.21.2 Installation: The instruments and instrument panel shall be installed in accordance with MIL-I-5997.

(40) 3.21.3 Mountings: All instruments shall be removable from the front of the panel.

3.21.4 Marking: Operating limits shall be indicated on the instrument glasses in accordance with TM 55-6600-200-20.

3.21.5 Pitot System: A pitot static system shall be installed.

3.21.6 Piping and Connections: Flexible plastic (nylon) tubing and/or aluminum alloy tubing shall be used in the systems. All tubing shall be free from sharp bends and traps. A readily accessible drain shall be provided for the pitot system. AN, MS or applicable connections shall be used in the installation.

3.22 Air Rescue Subsystem: Not applicable.

3.23 Range Extension Subsystems: Not applicable.

3.24 Air Weather Subsystems:

3.24.1 Transparent Areas: A defrosting system shall be provided which will meet the general requirements of MIL-T-5842. The design of the defrosting system shall be such that heated air will be directed to the forward and side transparent areas. The air source for the defrosting system shall be engine compressor bleed air.

3.24.1.1 Defogging: Defogging shall be provided for the windshield and pilot's side panel area. Defogging shall be provided utilizing the ducting of the distribution system.

3.24.1.2 Anti-Icing: Anti-icing shall be available for the windshield and pilot's side panel area. The anti-icing system utilizes the same air and routing as for defogging.

3.24.2 Engine: A manually operated engine anti-icing system shall be provided.

3.25 Preflight Readiness Checkout Provisions: A rapid readiness checkout of the aircraft and its installed systems is facilitated by inspection panels and doors, caution lights, press-to-test switches, check lists, et cetera.

3.26 Kit Obtainable from Contractor: If the procuring agency desires any of the listed kits for installation on the Model AH-1G Tactical Helicopter, they may be obtained from the contractor at additional cost.

3.26.1 Ground Handling Kit: The ground handling kit shall consist of dual wheels and a mechanism for raising and lowering the handling wheels. The dual wheels are for installation on each skid and shall be suitable for ground handling.

3.26.2 Component Covers Kit: The component covers kit shall consist of covers for the following items:

Main Rotor Blades
Tail Rotor Blades and Hub Assembly
Main Rotor Hub and Mast Assembly

3.26.3 Air Transportability Kit: The air transportability kit shall consist of the necessary equipment for loading and unloading, and stowing the Model AH-1G Tactical Helicopters in the following type aircraft: C-5, C-124, C-130 and C-141.

3.26.4 Maintenance Platform Kit (Engine Area): The engine area maintenance platform kit shall consist of a platform capable of being suspended from the aircraft structure. The platform shall be capable of being attached to either the right or left side of the engine area.

3.26.5 Maintenance Platform Kit (Wing Area): The wing area maintenance platform kit shall consist of a platform capable of being attached to either the right or left wing.

3.26.6 XM-35 Armament Provisions Kit: The XM-35 armament provisions kit shall consist of all necessary electrical wiring, controls, structural provisions, and miscellaneous hardware to provide the aircraft with complete provisions for the XM-35 weapon subsystem.

4. QUALITY ASSURANCE PROVISIONS

4.1 The Quality Assurance Provisions shall be as required by the procuring agency.

5. PREPARATION FOR DELIVERY

5.1 Delivery requirements shall be as required by the procuring agency.

6. NOTES

6.1 Explanatory Information: This specification is written in accordance with MIL-STD-832.

6.2 Definitions: Where the phrases "complete provisions for", "structural provisions for", "space provisions for", "weight provisions for", and "power provisions for" are used, the intent is defined as follows:

6.2.1 Complete Provisions For: Complete provisions for a specific item of equipment, or assembly or installation, shall mean that all supports, brackets, tubes and fittings, electrical wiring, hydraulic lines, etc., have been installed and adequate weight and space allocated in order that the equipment can be installed without alteration to the specified equipment or the aircraft, and that no additional parts are required for installation, other than the item itself. Standard stock items such as nuts, bolts, cotter pins, etc., need not be furnished.

6.2.2 Structural Provisions For: Structural provisions for a specific installation shall mean that the primary structure will be structurally adequate for the installation, but that brackets, bolt holes, electrical wiring, hydraulic lines, etc., will not be required. Structural provisions also include weight of the equipment involved as an element of alternate weight.

6.2.3 Space Provisions For: Space provisions for a specific installation shall mean that space only shall be allocated for the installation, and that brackets, bolt holes, electrical wiring, hydraulic lines, etc., will not be required. "Space provisions for" does not imply that adequate attaching structure is provided, unless otherwise stated.

AD-A058 222 BELL HELICOPTER TEXTRON FORT WORTH TEX F/G 1/3
DETAIL SPECIFICATION FOR MODEL AH-1G HELICOPTER FY-71 PROCUREME--ETC(U)
AUG 70 D A HILL DA-23-204-AMC-04075
UNCLASSIFIED BHT-209-947-105 NL

2 OF 2
AD
A058222

END
DATE
FILMED
10-78
DDC

6.2.4 Weight Provisions For· Weight provisions for means that suitable weight allowance to simulate later incorporation of the item or complete installation shall be included in the design gross weight for the aircraft and in all applicable structural design conditions. When weapons are involved, the structural design conditions shall include the effects of weapon reaction and blast loads as applicable.

6.2.5 Power Provisions For: Power provisions for means that the primary electrical, hydraulic, or pneumatic power and distribution system shall be sufficient to permit later incorporation of the installation without primary power and distribution system modification.

APPENDIX I-A

GOVERNMENT-FURNISHED AIRCRAFT EQUIPMENT
CONTRACTOR-INSTALLED

Note: The Government may, without altering the intent or purpose of this specification, furnish alternate equipment to that listed below so long as the alternate equipment is both functionally and physically interchangeable with the listed equipment and involves no appreciable weight change.

Item No.	Qty	Description	Identification	Unit Wt (lb)
		POWER PLANT (WEIGHT EMPTY)		
1	1	Engine, Lycoming (Dry)	T53-L-13 or T53-L-13A or T53-L-13B	540.00
2	1	Filter Assembly	204-040-760-5	3.82
3	1	Valve, Gate	AV16B1743D	2.00
4	1	Switch	204-040-376-3	0.32
5	1	Particle Separator	1-010-500-07	19.00
6	1	Foreign Object Damage Screen	1-010-680-01	3.50
		INSTRUMENTS (WEIGHT EMPTY)		
1	2	Transmitter, Oil Pressure, 0-100 psi (Engine and Xmsn)	MIL-T-26638 34401-30A22-1	1.00
2	2	Indicator Oil Pressure, 0-100 psi (Engine and Xmsn)	MIL-I-25438 217-01141	0.50
3	3	Generator, Electric Tachometer	MIL-G-26611 Type GEU-7/A	0.80
4	2	Indicator, Temp., Multi-Function Elec. Resis., -70° to 150°C (Engine Oil and Xmsn Oil)	MIL-I-6669 MS28009-1	0.70

APPENDIX I-A (Continued)

Item No.	Qty	Description	Identification	Unit Wt (lb)
		INSTRUMENTS (WEIGHT EMPTY) (Continued)		
5	2	Altimeter, Pressure	MIL-A-27229 Type AAU-8/A	1.50
6	1	Compass, Magnetic Pilot's Standby	MIL-C-5604A Type MB-1	0.75
7	1	Indicator, Turn and Slip	MIL-I-7805A MS28024-3	1.88
8	2	Indicator, Tachometer (Gas Producer)	MIL-I-25623 Type MU-1	0.75
9	1	Transmitter, Multi-Purpose Synchro Style 0-50 psi (Fuel Press. 320° Movement)	MIL-T-5882 MS28005-1	1.15
10	1	Indicator, RMI	ID-250/ARN	2.36
11	1	Indicator, RMI	ID-998()/ASN	3.94
12	1	Amplifier, Electrical Control	AM-3209()/ASN	0.89
13	1	Clock, 1 7/8" Dial, With Elapsed Time Indicator	MIL-C-6499 A-13A	0.45
14	2 (4)	Indicator, Pressure (Torque-Meter)	MIL-I-25438 217-01141	0.50
15	2	Transmitter, Multi-Purpose (Torque-Meter)	MIL-T-26638 34401-30A22-1	1.00
16	1	Indicator, Multi-Purpose, Pressure, Synchro Type 0-50 psi (Fuel Pressure)	MS28010-1	0.61
17	1	Indicator, Vertical Speed	FSN 6610-935-4278 MS25454-4	1.75

APPENDIX I-A (Continued)

Item No.	Qty	Description	Identification	Unit Wt (lb)
		INSTRUMENTS (WEIGHT EMPTY) (Continued)		
18	2	Indicator, Dual Tachometer	204-070-155-1	1.85
19	2	Indicator, Exhaust Temperature	Type MJ-2	0.70
20	1	Indicator, Course	ID-48( )/ARN	1.88
21	2	Indicator, Airspeed Pilot and Gunner	209-070-178-1	1.0
		RADIO AND RADAR (WEIGHT EMPTY)		
		UHF Radio Set AN/ARC-51BX		
1	1	Receiver-Transmitter	RT-742()/ARC-51BX	29.47
2	1	Mounting	MT-2653()/ARC	0.31
3	1	Control	C-6287()/ARC-51BX	3.65
4	1	Cooler, Air Electronic	HD-615()/ARC-51X	1.00
5	1	Indicator, VSWR	ID-1003()/ARC	1.10
		Antenna AT-1108( )/ARC		
1	1	Antenna	AT-1108()/ARC	3.24
		FM Radio Set AN/ARC-54		
1	1	Receiver-Transmitter	RT-348()/ARC-54	22.33
2	1	Mounting	MT-1535()/ARC-54	1.40
3	1	Control	C-3835()/ARC-54	2.03
4	1	Kit, Connector	FSN5935-695-4914	0.20
		or		
		FM Radio Set AN/ARC-131		
1	1	Receiver-Transmitter, Radio	RT-823()/ARC-131	25.0
2	1	Mounting	MT-3664()/ARC-131	1.5
3	1	Control Unit, FM	C-7088()/ARC-131	2.0
4	1	Kit Connector	FSN5935-695-4915 MX-709299-801	.13

APPENDIX I-A (Continued)

Item No.	Qty	Description	Identification	Unit Wt (lb)
		RADIO AND RADAR (WEIGHT EMPTY) (Continued)		
		Control, Interphone C-1611( )/AIC		
1	2	Control, Interphone	C-1611( )/AIC	1.80
		Direction Finder Set AN/ARN-83		
1	1	Receiver	R-1391/ARN-83	9.00
2	1	Mounting	MT-3605/ARN-83	1.90
3	1	Control	C-6899/ARN-83	1.71
		Gyro Magnetic Compass AN/ASN-43		
1	1	Transmitter, Remote Compass with Single Cycle Error Compensator	T-611( )/ASN CN-405( )/ASN	1.23 0.23
2	1	Gyro, Directional Electrically Driven	CN-998( )/ASN-43	5.50
		VHF Radio Set AN/ARC-134		
1	1	Receiver-Transmitter	RT-857/ARC-134	16.60
2	1	Mounting	MT-3791B/ARC-134	1.50
3	1	Control	C-7197/ARC-134	1.50
		Transponder Set AN/APX-72		
1	1	Receiver-Transmitter	RT-859/APX-72	14.82
2	1	Mounting	MT-3809/APX-72	1.25
3	1	Control	C-6280(P)/APX	2.50
4	1	Antenna	AT-884( )/APX-44	0.50
5	1	Mounting (For Mark XII)	MT-3949A/U	
		TSEC/KY-28		
1	1	Control	C-8157/ARC	1.5
2	1	Mounting	MT-3802/ARC	4.2
3	2	Discrete Signal Discriminator	MD-736/A	1.0

APPENDIX I-A (Continued)

Item No.	Qty.	Description	Identification	Unit Wt (lb)
		ELECTRICAL (WEIGHT EMPTY)		
1	1	Inverter, 250 VA	PU-543( )/A	13.80
2	1	Light, Anticollision	MIL-L-58085	2.00
3	1	Deleted		
4	1	Battery, NICAD, 22-ampere-hour	BB-649/A	47.50
5	1	Searchlight	FSN 6220-283-9767	5.40
6	1	Generator, Starter	204-060-200-1	48.0
7	1	Rate Switching Gyro (For Attitude Indicators)	Type MC-1	1.5
8	1	RCDS Indicator	FSN 1090-435-4710	3.38
9	2	RCDS Programmer	FSN 1055-435-4711	5.50
10	1	RC Fuse Setter System		14.00
		MISCELLANEOUS (WEIGHT EMPTY)		
1	1	Kit, First-Aid	Med Stock 9-196-650	1.75
2	1	Extinguisher, Fire	FSN 4210-555-8837	7.95
3	1	Harness, Shoulder (Pilot)	Type G-1 50D3770	1.29
4	1	Reel, Shoulder Harness (Pilot)	0106176-0	1.80
5	2	Belt, Lap	MD-2 54H19651	2.78
6	2	Tool, Canopy Breaker, With Retainer	TLU 146/A 61D4383	1.60
7	1	Blower, Turbine	204-060-448-3 FSN 2935-916-2528	8.90

APPENDIX I-A (Continued)

Item No.	Qty	Description	Identification	Unit Wt (lb)
		ARMAMENT (WEIGHT EMPTY)		
1	1	Armament, Subsystem	XM-28	320.00
2	1	Sight, Pilot	XM-73	6.38
		CONTROLS (WEIGHT EMPTY)		
1	1	Tail Rotor Chain	204-001-739-3	0.58
2	3	Magnetic Brake	204-001-376-3	1.85

APPENDIX I-B

GOVERNMENT-FURNISHED AIRCRAFT EQUIPMENT
GOVERNMENT-INSTALLED

Item No.	Qty	Description	Identification	Unit Wt (lb)
		RADIO AND RADAR (NOT INCLUDED IN WEIGHT EMPTY)		
		IFF Auxiliary Items		
1	1	Transponder Test Set	TS-1843( )/APX	3.0
2	1	Mark XII Computer	KIT-1A/TSEC	15.0
		TSEC/KY-28		
1	1	Security Set	TSEC/KY-28	17.0
		PASSIVE DEFENSE SUBSYSTEM (INCLUDED IN WEIGHT EMPTY)		
1	2	Chest and Torso Protector	FSN 8470-NTK-5601	13.42

APPENDIX II

DEVIATIONS

Deviation	Paragraph	
1	3.3.2.1	Control Characteristics

Requirement: Specification MIL-H-8501 shall be used as a design guide for the stability and control characteristics for this aircraft, except for paragraph 3.6 (Instrument Flight Conditions).

Deviation: Those requirements of MIL-H-8501, paragraph 3.3 pertaining to control continuity shall not be applicable.

Reason: Aerodynamic discontinuities due to airflow patterns effect tail rotor thrust during some phases of sideward and rearward flight. Increased tail rotor rigging to compensate for the disturbance results in over torque of the tail rotor drive system.

2	3.4.2.1	Landing

Requirement: Paragraph 5.4 of ANC-2 states that a side load equal to 50 percent of the vertical load be combined with the vertical load in the design of the tail bumper.

Deviation: The tail bumper design will not combine the side load with the vertical load.

Reason: The tail bumper used on the AH-1G is the same as used on the UH-1C/H. Many years of service experience have proven that this bumper will satisfactorily perform the function for which it was intended.

3	3.4.7	Rotor Induced Vibration

Requirement: Paragraph 3.7.1(b) of MIL-H-8501A reads as follows: Vibration accelerations at the pilot, crew, passenger and litter stations at all steady speeds between 30 knots rearward and V_{cruise} shall not exceed 0.15g for frequencies up to 32 cps and a double amplitude of 0.003 inch for frequencies greater than 32 cps.

APPENDIX II (Continued)

Deviation	Paragraph	
3 (Continued)	3.4.7	Rotor Induced Vibration

From V_{cruise} to V_{limit} the maximum vibratory acceleration shall not exceed 0.2g up to 36 cps, and a double amplitude of 0.003 inch for frequencies greater than 36 cps. At all frequencies above 50 cps a constant velocity vibration of 0.039 fps shall not be exceeded.

Deviation: For the acceptance of production aircraft, the vibration level shall be objectionable if the measurements taken at the pilot's station, gunner's station, and gun sight(s) mounting structure of representative aircraft indicate values in excess of:

SINGLE AMP. G	ROTOR HARMONIC
.10	1/R
.20	2/R
.20	4/R
.25	6/R
.30	8/R
.40	10/R

The flight conditions shall be:

(a) Density altitude of 2500 feet

(b) Level flight and stabilized

(c) 1100 SHP at main transmission input

(d) 19 round rocket pods on outboard store station (unfaired)

(e) Gross weight/σ ratio of 7500 pounds minimum

APPENDIX II (Continued)

Deviation	Paragraph	
3 (Continued)	3.4.7	Rotor Induced Vibration

(f) Center of gravity between stations 193 and 194

(g) Main rotor rpm of 324

Reason: To define vibration characteristics required by the AH-1G helicopter.

4 3.4.8.3 Rotor Speed Limit, Power-On

Requirement: Paragraph 6.3.27 of MIL-S-8698 defines rotor speed, limit, power on, as designed maximum rotor speed, power on, multiplied by the factor 1.25.

Deviation: Rotor speed, limit, power on, to be designed maximum rotor speed power on (324 rpm), multiplied by the factor 1.10 (356 rpm).

Reason: The limit rotor speed factor of 1.25 applied to the maximum rotor speed, power on, is considered unrealistic for the following reasons.

(a) The maximum overspeed obtainable with the governor operative is equivalent to a factor of 1.03 (334 rotor rpm, or 6800 engine rpm).

(b) With governor inoperative, past experience indicates that average pilot technique shall limit the overspeed to approximately 20 rpm which is equivalent to a factor of 1.06 (344 rotor rpm, or 7000 engine rpm).

(c) The ultimate factor of 1.50 which is applied to limit stress (using the minimum values per ANC-5) is equivalent to a rotor speed of 436 rpm, or a factor of 1.35 (8900 engine rpm).

APPENDIX II (Continued)

Deviation	Paragraph
4 (Continued)	3.4.8.3 Rotor Speed Limit, Power-On

Reason: (Continued)

(d) Designing to a factor of 1.15 (the factor allowed for the UH-1A in Detail Specification 204-947-050 which is equivalent to 373 rpm) would impose a weight penalty of approximately 10 pounds.

(e) Designing a limit rotor speed of 356 rpm would not dictate replacement of parts until this limit speed is exceeded by the factor $\sqrt{1.1}$ (373 rotor rpm or 7600 engine rpm). The factor $\sqrt{1.1}$ is derived from the fact that for materials used in the rotor ultimate strength to yield strength ratio is always equal to or greater than 1.5:1.1, which insures a yield margin of safety of at least 10 percent greater than ultimate margin of safety (yield margin is calculated on a factor of 1.0 on limit loads).

5 3.4.8.6 Rotor Speed Limit, Power-Off

Requirement: Paragraph 6.3.30 of MIL-S-8698 defines rotor speed, limit, power off, as design maximum rotor speed, power off, multiplied by the factor 1.25.

Deviation: Rotor speed, limit, power off, to be the design maximum rotor speed, power off (339 rpm), multiplied by the factor 1.05 (356 rpm).

Reason: The limit rotor speed factor of 1.25 applied to the design maximum rotor speed, power off, is considered unrealistic for the following reasons:

(a) The maximum overspeed attainable is limited by low blade angle which is set for approximately 339 rpm.

APPENDIX II (Continued)

Deviation	Paragraph	
5 (Continued)	3.4.8.6	Rotor Speed Limit, Power-Off

Reason: (Continued)

(b) The ultimate factor of 1.50 which is applied to limit stress (using the minimum values per ANC-5) is equivalent to a rotor speed of 436 rpm, or a factor of 1.25 of maximum design rpm power off.

(c) Design to a factor of 1.15 (factor allowed for UH-1A in Detail Specification 204-947-050 which is equivalent to 390 rpm) would impose a weight penalty of approximately 15 pounds.

(d) Designing to a limit rotor speed of 356 rpm would not dictate replacement of parts until this limit speed is exceeded by the factor $\sqrt{1.1}$ (373 rotor rpm or 7600 engine rpm). The factor $\sqrt{1.1}$ is derived from the fact that for materials used in the rotor the ultimate strength to yield strength ratio is always equal to or greater than 1.5:1.1, which insures a yield margin of safety of at least 10 percent greater than ultimate margin of safety (yield margin is calculated on a factor of 1.0 on limit loads).

6	3.5.1.2	Main Rotor Blade Construction

Requirement: Part J, Chapter 4, of Volume I, HIAD, Paragraph 2.2, states that for metal rotor blades the maximum oscillatory bending moment in the spar shall not exceed 20,000 inch-pounds.

Deviation: Oscillatory stresses at V_{max} shall not exceed the maximum allowable stress for 20×10^6 cycles.

Reason: "Maximum bending moment" is not definitive.

7	3.5.1.4.1.3	Bearings

Requirement: Volume I, Part J, Chapter 4, Paragraph 3.1 of HIAD, specifies that the manufacturer's dynamic ratings be used to select bearings for rotor systems.

APPENDIX II (Continued)

Deviation	Paragraph	
7 (Continued)	3.5.1.4.1.3	Bearings

Deviation: Manufacturer's dynamic rating will not be used to select bearings for the rotor system.

Reason: A system for evaluation of bearings used in this application has not been devised. The use of manufacturer's ratings as a basis for bearing selection entails severe weight penalty for unrealistic bearing sizes. Bearings are selected by comparison with previous applications of this type.

8	3.6	Auxiliary Rotor Blade Clearance

Requirement: Paragraph 3.6.5.3 of MIL-S-8698 specifies that "The clearance between auxiliary rotor blades and other parts of the aircraft shall not be less than 6 inches under all operating conditions."

Deviation: The Model AH-1G auxiliary rotor clearance shall be from 2.0 to 2.5 inches.

Reason: ARDC Letter RDZSRA, Item 79, dated 4 November 1955, approved 3.4 inches clearance. On the UH-1B, increased air speed resulted in a greater degree of flapping of the tail rotor. The tail rotor flapping angle was increased to preclude the hitting of the static stop during normal flight operations. Extensive flight testing of the aircraft has substantiated that the 2.0 to 2.5 inches clearance is satisfactory for all aircraft operations.

9	3.7.1.3.9.1.	Seats

Requirement: Drawing MS33575 requires that the seat be provided with fore and aft and vertical adjustment.

Deviation: The pilot's seat shall not be adjustable fore and aft. The gunner's seat shall not be provided with seat adjustments.

APPENDIX II (Continued)

Deviation	Paragraph	
9 (Continued)	3.7.1.3.9.1.	Seats

Reason: Compact design and use of adjustable pedals alleviates the need of fore and aft adjustments for the seat.

10	3.10.1	Primary Flight Control System

Requirement: Paragraph 3.1.2.1.2.1 of MIL-F-9490 requires duplication of cable systems for the main rotor to the cockpit area.

Deviation: Duplicate cable controls shall not be provided.

Reason: Duplicate controls are not provided because of the prohibitive weight and space required.

11	3.10.1	Primary Flight Control System

Requirement: Paragraph 3.1.2.1.2.2 of MIL-F-9490 requires duplication of tail rotor controls.

Deviation: Duplicate tail rotor controls shall not be provided.

Reason: Duplicate tail rotor controls are not provided because of the prohibitive weight and space required.

12	3.10.1	Primary Flight Control System

Requirement: Paragraph 4.12.3 of MIL-F-9490 states, in part, that "jam nuts are not considered adequate for rod end safetying."

Deviation: Jam nuts are utilized for rod end safetying.

Reason: The control system adjustable rods have a riveted clevis on one end and jam nuts on opposite end. The riveted clevis prevents rotation of the control rod in the event of jam nut loosening.

APPENDIX II (Continued)

Deviation	Paragraph	
13	3.10.1.1	Flight Stations Controls

Requirement: The flight station controls for the pilot and copilot shall be in general accordance with the requirements of Drawing AD1 of HIAD.

Deviation: The Model AH-1G flight station controls will be as on the prototype aircraft.

Reason: The contractor feels that the aircraft flight station controls are an optimum design.

14	3.10.4	Stability and Control Augmentation System

Requirement: MIL-H-8501A required that following an abrupt complete disengagement or an abrupt complete failure of automatic stabilization equipment with controls free for 3 seconds following the disengagement or failure, the resulting rates of yaw, roll and pitch shall not exceed 10 degrees per second and the normal acceleration shall not exceed ± 1/2g.

Deviation: The maximum control free time shall not exceed 1 second and the limits on pitch, roll and yaw rates and accelerations shall not be applicable.

Reason: The requirements of MIL-H-8501A are not compatible with the requirements for a weapons aircraft which is not intended to be flown hands off (as with an auto-pilot) for any extended period of time. Further, the time constants required for the AH-1G are not compatible with a 3 second delay in corrective control action and the rates and accelerations around all three axes.

15	3.11.3	Firewalls

Requirement: HIAD, Section D3-3.24, states in part, to incorporate in each engine installation of all aircraft regardless of the number or relative position of the engines, a stainless steel diaphragm that separates the burner and tailpipe section from the accessory and compressor section. Make the diaphragm as liquid and gas tight as possible.

APPENDIX II (Continued)

Deviation	Paragraph	
15 (Continued)	3.11.3	Firewalls

Deviation: No liquid and gas tight seal is provided.

Reason: The cooling air management system requires that the engine exhaust gas be used as a primary air supply and engine compartment cooling air as secondary.

16 3.12.5 Air Induction System

Requirement: HIAD, Section D.3-7.3.4 states in part, "Protect the entrance to the air induction system against ice accretion."

Deviation: No specific ice protection shall be provided.

Reason: The inlet screen provided with the particle separator will be retractable for both an icing and blocked condition. To provide warning for both conditions a pressure sensing device is used in lieu of an ice detector.

17 3.12.7 Cooling System

Requirement: HIAD, Section D.3-3.3.1, states "provide separate cooling for the accessory or forward engine compartment and the high temperature aft engine compartment. Under no condition allow air passages, ducts, or intakes to pass through the engine firewall, unless the duct or passage is made of stainless steel and adequately sealed and protected from damage by fire. Make the firewall liquid-tight and as vapor-tight as possible in order to function as a fireseal."

Deviation: No separate cooling between the forward engine and the aft engine compartment will be provided.

Reason: Provision is made to protect the tail pipe by a blanket. The skin temperature of the blanket is below 700°F, therefore, the forward engine compartment is extended aft and around the tail pipe. The compartment temperature gradient is within specification limits as inducted airflow is such that a heat transfer balance is maintained.

APPENDIX II (Continued)

Deviation	Paragraph	
18	3.12.8.3	Tank

Requirement: HIAD, Section D.3-4.3.1.5, states, "Provide all aircraft with a continuous oil quantity gaging system incorporating a quantitative cockpit readout and cockpit low level warning light in accordance with MIL-O-38338 or as approved by the procuring agency....."

Deviation: No oil quantity gaging system and cockpit readout will be provided. No in-cockpit low-level warning light will be provided.

Reason: Oil tank capacity is such that engine oil consumption at engine specification rate for fuel quantity aboard will not exceed quantity available.

19	3.12.8.3	Tank

Requirement: HIAD, Section D.1-5.3.2.12, states, in part, that any oil tank shall not be located forward of the air inlet.

Deviation: The oil tanks are located forward of the air inlet.

Reason: The basic configuration of the aircraft dictates the location of the tanks.

20	3.12.8.3	Tank

Requirement: HIAD, Section D.1-5.3.2.3, states, in part "Provide oil tanks with means to gain access to all corners and sections of the interior when installed in the aircraft."

Deviation: No means of cleaning when installed in the aircraft.

Reason: The tank is designed to MIL-T-5579.

APPENDIX II (Continued)

Deviation	Paragraph	
21	3.12.8.3	Tank

Requirement: MIL-T-5579 requires sealing against .50 caliber and 20 mm hits.

Deviation: The tank shall be qualified for a .30 caliber protection.

Reason: The size of the oil tank precludes meeting these requirements. The .30 caliber level of protection now provided is equivalent to the balance of the passive defense requirements.

22	3.12.8.4 3.12.9.5	Piping and Fittings

Requirement: HIAD, Tenth Edition, Section D.1-3.7.2.2 requires that MS28741 hose assemblies or equivalent be installed from the firewall to the power plant.

Deviation: Hose assemblies in accordance with BHC Procurement Specification 299-947-045 shall be used.

Reason: Weight and space saving. The BHC assemblies are lighter employing smaller end fittings.

23	3.12.9.1	Fuel System

Requirement: HIAD, Section D.3-5.2.1 states, in part, that the static pressure of the fuel at the engine fuel inlet connection with booster pumps inoperative, will be higher than the ambient pressure minus 2 psi at altitudes from sea level to 6000 feet.

Deviation: The static pressure of the fuel at the engine fuel inlet connection with boost pump inoperative will be greater than ambient pressure minus 3 psi at altitudes from sea level to 6000 feet with the engine operating at "take-off power".

Reason: The basic configuration of the aircraft dictates the location of the tank in which the tank is below the engine inlet.

APPENDIX II (Continued)

Deviation	Paragraph	
24	3.12.11.2.1	Power Control Lever

Requirement: The HIAD, Part J, Chapter 2, paragraph 2.6.2.1 states that 150 degrees shall be the maximum power level control grip rotation.

Deviation: Power control level grip rotation shall be 240 degrees.

Reason: Ground and flight tests indicate that the increase in power control level grip rotation was necessary due to power level control sensitivity.

25	3.12.15	Transmission System

Requirement: Paragraph 3.12.15 of MIL-STD-832 requires that for Army aircraft the transmission rating be equivalent to the installed engine rating.

Deviation: The transmission power rating of 1100 input shp at 6400 rpm is less than the engine maximum rating.

Reason: In consideration of providing altitude and elevated temperature performance capability and maintaining optimum transmission weight, the transmission rating is less than the engine rating.

26	3.12.15	Transmission System

Requirement: Paragraph 3.3.9 of MIL-T-5955A specifies that a rotor brake, capable of reducing the main rotor speed from 40 percent of rated speed to a dead stop in not more than 30 seconds with engine power off, shall be furnished.

Deviation: A rotor brake will not be furnished.

Reason: Not applicable to this program.

27	3.12.15.3.1	Scupper Drain Line

Requirements: Paragraph 3.3.11.1.15 of MIL-T-5955A, requires in part that a scupper drain line be installed to prevent overfilling.

Deviation: A scupper drain line shall not be installed.

APPENDIX II (Continued)

Deviation	Paragraph
27 (Continued)	3.12.15.3.1 Scupper Drain Line

Reason: The infrequent oil servicing required for this system does not warrant the weight and maintenance complexity associated with the scupper drain.

28 3.13.1.1 Electrical Systems

Requirement: (a) Paragraph 3.1.1 of MIL-E-25499A requires that design data be in accordance with MIL-S-25063.

(b) Paragraph 3.2.2.5.1 of MIL-E-25499A, requires that Distribution Feeder Protection be provided.

(c) Paragraph 3.2.6 of MIL-E-25499A requires that Separate Emergency Circuits be provided.

(d) Paragraph 4.3.1 of MIL-E-25499A requires that Mockup and Flight Tests be in accordance with MIL-F-25381 and MIL-M-25500.

Deviation: (a) Paragraph 3.1.1 of MIL-E-25499A shall not be applicable.

Reason: This paragraph refers to MIL-S-25063, which is for Air-Vehicle Weapons System. This contract does not require the weapons system.

Deviation: (b) Distribution Feeder Protection shall not be provided.

Reason: The Model AH-1G will be essentially a single generator system having a backup battery.

Deviation: (c) Separate emergency circuits shall not be provided.

Reason: The battery provides a backup power source for essential equipment.

APPENDIX II (Continued)

Deviation	Paragraph	
28 (Continued)	3.13.1.1	Electrical Systems

Deviation: (d) MIL-M-25500 requirements of paragraph 4.3.1 of MIL-E-25499A, not applicable.

Reason: Due to acceleration of the AH-1G program, approval shall be determined on a production prototype aircraft. Testing will be conducted in accordance with MIL-F-25381.

29	3.13.1.1	Electrical Power Subsystem

Not Applicable

30	3.13.1.2.1	Generator

Requirement: Paragraph 3.13.1.2.1 states that, space shall be provided for installation of an auxiliary generator not to exceed 300 ampere rating to be driven by the transmission.

Deviation: The contractor may install the ventilation system blower in the space provided for an auxiliary generator.

Reason: There is no immediate or foreseen requirement for an auxiliary generator to provide additional electric power.

APPENDIX II (Continued)

Deviation	Paragraph	
31	3.13.1.5	Wiring

Requirement: Paragraph 3.9.3(b) of MIL-W-5088C requires that wire numbers be assigned in accordance with equipment designation.

Deviation: R, S, T, and Y wire numbers shall be assigned in accordance with Government-furnished drawings.

Reason: To comply with the U. S. Army Electronics Command numbering system.

32	3.13.1.7.1	Side Console Panels

Requirement: Paragraph 3.5 of MIL-G-6781B requires that depth dimensions shall be the minimum required as specified in MS25212 and MS25213.

Deviation: The depth of the individual panels and the clearance depth of the side consoles shall be a minimum, consistent with good design.

Reason: To limit the projection of the side consoles into the cabin arm room and to provide easier access to the pilot's and gunner's seats.

33	3.13.1.7.1	Control Panels

Requirement: Paragraph 3.8 of MIL-C-6781B requires that a cable be brought out at the central area of the panel back and attached to a connector receptacle in accordance with MIL-C-26482, when the inclusion of disconnect plugs and receptacles cause a resultant overall control panel depth exceeding 6 1/2 inches. The overall length from the back of the front panel to the wire end of the cable clamp shall be 24 inches.

Deviation: Electrical receptacles in accordance with MIL-C-26482 or MIL-C-5015 shall be used where feasible; support for receptacles, if used, shall be separate from the control panel, and the length of the connector cables shall be as necessary.

APPENDIX II (Continued)

Deviation	Paragraph	
33 (Continued)	3.13.1.7.1	Control Panels

Reason: To facilitate the designing of minimum depth side consoles.

34 3.13.1.7.1 Control Panels

Requirement: Paragraphs 3.4.1 and 4.2.1 of MIL-C-6781B requires environmental testing.

Deviation: Environmental testing will not be conducted.

Reason: The control panels assembled by the contractor are an extension of the aircraft wiring which is not environmental tested.

35 3.13.1.7.1 Control Panels

Requirement: Paragraphs 3.4.2 and 4.2.2 of MIL-C-6781B requires decompression testing.

Deviation: Decompression testing will not be conducted.

Reason: The control panels assembled by the contractor are an extension of the aircraft wiring which is not decompression tested.

36 3.13.1.8 Lighting

Requirement: Paragraph 3.2.1.1 of MIL-L-6503C requires a test model for testing and approval of each lighting installation.

Deviation: A test model of the lighting installation will not be made.

Reason: Due to acceleration of the AH-1G Program, lighting approval will be on a production prototype aircraft.

APPENDIX II (Continued)

Deviation	Paragraph	
37	3.13.1.8	Lighting

Requirement: Paragraph 3.2.2 of MIL-L-6503C requires that a lighting system mockup be provided for inspection and approval.

Deviation: A lighting system mockup will not be provided.

Reason: Due to acceleration of the AH-1G Program, lighting approval will be on a production prototype aircraft.

38	3.13.1.8.4	Landing Lights

Not applicable

39	3.21.2	Instrument Panel

Requirement: Paragraph 3.2.6 of MIL-I-5997A(2) specifies that a minimum of 10 inches shall be provided behind the main instrument panel to accommodate the instruments and connections when installed.

Deviation: 10 inches clearance shall not be provided.

Reason: Due to the design, a minimum of 6.5 inches shall be provided behind the instrument panel, which is sufficient clearance on this aircraft.

40	3.21.3	Instrument Panel Mounting

Requirement: HIAD, Tenth Edition, Section C.5-1.2 requires that for instruments requiring electrical connections, use sufficient wiring to insure instrument withdrawal for disconnecting with a 4 inch minimum length of wire available in front of board.

Deviation: The 4 inches of wire shall not be provided.

Reason: The instruments are accessible from the side and bottom of the instrument panel; also, the instruments are accessible from the gunner's compartment after removal of the gunner's seat back panel.

APPENDIX II (Continued)

Deviation	Paragraph	
41	3.13.2.1	Description and Components

Requirement: Paragraph 3.7.2 of MIL-H-5440 requires a priority valve for the flight controls when the utility hydraulic system is utilized for one-half the dual actuator system.

Deviation: The priority valve will not be installed in the utility system.

Reason: Flight tests have demonstrated no deterioration of control with the priority valve either installed or omitted; also improved reliability of the weapon system.

42	3.2.7	Identification and Markings

Requirement: Army Technical Bulletin TB 746-93-2 requires the following:

(a) Paragraph 50b states in part, "Apply a 6-inch band of gloss red laquer at outboard end of blade followed by another 6-inch band of gloss white, then another 6-inch band of red laquer. Following the second band of bright red laquer, apply a band of black laquer up to within 6 inches of the hub. Paint remainder of tail rotor blade with gloss red laquer."

(b) Paragraph 53, figure 78, code number 56, figure 80, code number 31 states in part, "To reduce glare, the top of the fuselage in front of the pilot's compartment on aircraft will be painted lusterless black."

(c) Figure 78, code number 17 states in part, "A 2-inch wide lusterless black strip over top of cowl to show turbine wheel at WL 92.75, 10-1/2 inches forward from rear of cowl."

Deviation: (a) Apply a 6-inch band of yellow-orange laquer at outboard end of blade only.

Reason: AVCOM Letter AMCPM-IR/Robert R. Corey, dated 12 January 1968.

Deviation: (b) The fuselage adjacent to the windshield will be painted lusterless olive drab (camouflage).

Reason: AVCOM Letter AMCPM-IR/Robert R. Corey, dated 12 January 1968.

Deviation: (c) The 2-inch wide lusterless black strip will not be painted over top of cowl.

Reason: AVCOM Letter AMCPM-IR/Robert R. Corey, dated 12 January 1968.

APPENDIX II (Continued)

Deviation	Paragraph	
43	3.5.1.1.2	Main Rotor Blade Paint Scheme

Requirement: Army Technical Bulletin TB 743-96-2, paragraph 4-9b states in part, "Lower surfaces of all main rotor blades will be finished with lusterless black lacquer and all upper surfaces finished lusterless olive drab."

Deviation: Lower and upper surfaces of main rotor blades will be finished lusterless olive drab.

Reason: AVCOM Letter AMCPM-IR/Robert R. Corey, dated 12 January 1968.

44	3.3.2.1	Cyclic Breakout Force

Requirement: Paragraphs 3.2.4, 3.2.7 and 3.3.11 specify that the cyclic breakout force shall be not less than 0.5 pounds nor more than 1.5 pounds. Also, the breakout force shall not be greater than the force produced by the trim force gradient in the first inch of stick travel.

Deviation: The breakout force for the pilot's cyclic shall be 2.0 ±0.25 pounds.

Reason: The design values of the aircraft's cyclic breakout force are such that: (1) to prevent stability augmentation system feedback and (2) cyclic stick flop. The aircraft handling qualities test conducted by ATA pilots have shown that the aircraft performed in accordance with MIL-H-8501 as defined in BHC Specification 209-947-042, Handling Qualities Demonstration.

45	3.13.1.10.3	Fuel Nozzle Ground Receptacle

Requirement: Paragraph 3.1.8.3.2 of MIL-E-7080 states, in part, "fuel nozzle grounding receptacles shall be installed in accordance with AND10439." The installation requirements of AND10439 states that the fuel nozzle grounding receptacle be installed at a distance of between 12 and 42 inches from each fuel tank or cell opening.

APPENDIX II (Continued)

Deviation	Paragraph	
45 (Continued)	3.13.1.10.3	Fuel Nozzle Ground Receptacle

Deviation: The fuel nozzle ground receptacle shall be installed at a distance of between 10 and 42 inches from the filling neck.

Reason: With the type of fueling utilized by this aircraft, 10 inches from the grounding receptacle to the filler neck provides adequate clearance.

46	3.12.9.7	Fuel Quantity Gages

Requirement: Paragraph 3.13.1 of MIL-G-7940 defines the requirement for capacitance values that are to be marked on the placard in the vicinity of the gage adjustment components.

Deviation: The placard will not show any capacitance values.

Reason: The capacitance values will be given in TM55-1520-221-35 DS, GS and Depot Maintenance Manual Army Model AH-1G Helicopter.

47	3.7.1.3.10.5	Fire Detector Installation

Requirement: (a) Paragraph 3.5.7 of MIL-F-7872C states in part, "The system, when actuating, shall display a legend-type warning signal showing the word "FIRE" in bold red lettering at least 1/2 inch in height."

(b) Paragraph 3.6.2.1 of MIL-F-7872C states in part, "Detachable sensing elements shall be furnished only in 36, 60, 120 and 180-inch lengths, with a tolerance of plus or minus 1/2 inch."

(c) Paragraph 3.5.12 of MIL-F-7872C states in part, "A test switch shall be provided in the immediate vicinity of each related warning signal."

Deviation: (a) Lettering shall be 3/8 inch in height.

(b) Detachable sensing elements shall be furnished in lengths other than those specified.

(c) A test switch shall not be provided for the gunner's panel.

APPENDIX II (Continued)

Deviation	Paragraph	
47 (Cont'd)	3.7.1.3.10.5	Fire Detector Installation

Reason: (a) Lettering 3/8 inch in height is the largest available procurable off-the-shelf and this size is consistent with space available.

(b) Nonstandard length sensing elements should be used to afford the highest reliability from the standpoint of both function and service without compromising on installation security irrespective of standard sensor lengths.

(c) AVSCOM Letter AMSAV-A-PUA, 14 January 1970, W. E. Hansell, requested that a fire warning light be added to the gunner's panel but that a test switch would not be necessary for the gunner's panel.

48	3.2.7	Identification and Marking

Requirement: Chapter 6, Section I, Paragraph 46 of TB-746-93-2 states in part "Decals conforming to the requirements of Military Specification MIL-P-38477, Plastic Film for Marking Aircraft, may be used in lieu of paint."

Deviation: Decals shall be in accordance with MIL-D-8634B.

Reason: At this time, there is no known source for transparent backed decals in accordance with MIL-P-38477. Although lusterless olive drab backed decals are available, Bell Helicopter Company prefers to use the transparent backed decals to enable use of decals on MAP/MS as well as AH-1G aircraft.

49	3.13.1.1	Electrical System Installation

Requirement: Paragraph 3.1.8.3.4 of MIL-E-7080A(1) states "Provision shall be made to protect against an internal fault to an electrical equipment metal case from disrupting the power system. Switchgear (such as relays, circuit brakers, and switches) having metal cases for mounting, and which are in power feeders to busses or in unprotected circuits, shall be so installed that the case is electrically isolated from ground, except for a suitable small gage jumper wire which shall be provided between the case and ground to provide a current return path for internally grounded devices and for bonding in accordance with Specification MIL-B-5087."

APPENDIX II (Continued)

Deviation	Paragraph	
49 (Cont'd)	3.13.1.1	Electrical System Installation

Deviation: Electrical isolation of relays, circuit breakers, switches, and etc. shall not be provided.

Reason: Electrical isolation of relays, circuit breakers, switches, etc., to meet the requirements of paragraph 3.1.8.3.4 of MIL-E-7080A(1) would provide limited protection against a remote type of failure. The Model AH-1G has identical design concepts to all UH-1 series aircrafts in the electrical feeder lines, and thus no changes were made to meet this paragraph. Such changes would result in additional weight and reduced reliability. The requirement to electrically isolate these components is compounded by the lack of any AN or MS standard relays, circuit breakers, or switches that are designed with this requirement in mind. These components are designed to directly meet the requirements of the MIL-B-5087 Bonding Specification.

50	3.13.1.8.1	Instrument Lights

Requirement: Paragraph 3.2.6.1.3(b) of MIL-L-5667A states "Provide enough extra slack in the electrical lead of each instrument light in order that between 3 1/2 and 4 inches of the lead can be readily pulled through the instrument panel upon removal of the light from the instrument or panel.

Deviation: The 3 1/2 or 4 inches of wire shall not be provided.

Reason: (a) No connector is provided on the rear of the instrument light assemblies. The wire is an integral part of the light assembly.

(b) The power source end of the wires for the gunner's light assemblies are accessible from the nose compartment. The power source end of the wires for the pilot's light assemblies are accessible from the side and bottom of the instrument panel and from the gunner's compartment after removal of the gunner's seat back panel.

(c) Instruments may be removed from the instrument panel without removing the instrument lights.

APPENDIX II (Continued)

Deviation	Paragraph	
51	3.13.2.1	Hose Assemblies

Requirement: Hose assemblies shall conform to MIL-H-25579.

Deviation: Teflon hose conforming to MIL-H-25579 shall not be used from pump inlet to reservoir, on system 1 and 2.

Reason: The routing of 1.0 inch inside diameter hose dictates the use of rubber hose in accordance with MIL-H-58089 in lieu of teflon hose because of smaller bend radii and more flexibility.

52	3.7.1.3.12.1 and 3.21.2	Instrument Panel Installation

Requirement: (a) Paragraph 3.1.2 of MIL-I-5997B states in part "Main instrument panels should be mounted normal within ±15° to longitudinal axis of the aircraft."

(b) Paragraph 3.1.2a of MIL-I-5997B states "Self-contained gyroscopic turn and slip indicators shall be so mounted that their sensitive axes are parallel to the aircraft fuselage reference line commonly known as the longitudinal axis of the aircraft. Remote attitude indicators that have self-contained inclinometers shall be mounted with the dial vertical within ±2° to prevent erroneous indications during turns."

(c) Paragraph 3.1.5 of MIL-I-5997B states "The instrument panel shall be color No. 36231 of FED-STD-595."

(d) Paragraph 3.2.2 of MIL-I-5997B states "Vibration mounts shall be in accordance with the MS91527 series."

(e) Paragraph 3.2.4 of MIL-I-5997B states in part "The location of the vibration mounts shall be such that they will be on a plane which passes through the center of gravity of the instrument panel complete with instruments."

(f) Paragraph 3.2.5 of MIL-I-5997B states "The load size of the mounts that are to be used for a given instrument panel shall be determined by the total weight of the completely assembled instrument panel divided by the number of vibration mounts used to support the load. The figure obtained will be substantially the weight borne by each vibration mount and the unit with the proper load rating shall be selected accordingly. In case this figure falls within the overlap of the load ratings, it is preferable to use the vibration mount with the high load rating."

APPENDIX II (Continued)

Deviation	Paragraph	
52 (Cont'd)	3.7.1.3.12.1 and 3.21.2	Instrument Panel Installation

Deviation: (a) The gunner's instrument panel is mounted 38° from the longitudinal axis of the aircraft.

(b) The gunner's inclinometer is tilted with the panel (38°). The pilot's turn and slip indicator is tilted with the panel (12°).

(c) Pilot's and gunner's panels shall be lusterless black Color No. 37038 in lieu of grey.

(d) Bell STD-90-011 isolation mounts shall be used in lieu of MS91527.

(e) The vibration mounts are on a plane other than through the center of gravity of the instrument panel complete with instruments.

(f) The load size of the mounts shall not be determined by the method specified above.

Reason: (a) The instrument panel is more nearly normal to the gunner's line of vision.

(b) The instruments are more nearly normal to gunner's and pilot's line of vision. Both gunner's inclinometer and pilot's turn and slip indicator operate normally in these positions.

(c) Lusterless black paint has lower reflective qualities than color specified, and required by the Detail Specification.

(d) Because of the use of energy absorbing material in a very stiff mounting, the vibration isolation mounts have been successful in reducing g loads on the instruments.

(e) Because of the stiffness of the vibration isolation mounts used, no advantage can be had by making the plane of the mounts pass through the cg of the panel with instruments installed.

APPENDIX II (Continued)

Deviation	Paragraph	
52 (Cont'd)	3.7.1.3.12.1 and 3.21.2	Instrument Panel Installation

Reason: (f) Tests conducted on the XH-40 and H-13 series helicopters with standard vibration isolation techniques were found unsuccessful and unwarranted. Tests made on the AH-1G helicopter using a shock mount method based on shock loads rather than vibration isolations has been successful in reducing g loads on the instruments.

APPENDIX III-A

INTERCHANGEABLE ITEMS BETWEEN
MODEL AH-1G AND UH-1C HELICOPTER

Main Rotor Blades - 540-011-250

Mast Friction Collective - 540-011-384

Transmission Lift Link - 209-030-357-1

Transmission 5th Mount Support - 204-031-246

Tail Rotor Drive Shaft - 204-040-620

Tail Rotor Hanger Assy - 204-040-600

42-Degree Gear Box - 204-040-003

Elevator Support - 205-030-447

Tail Rotor Control Quill Assy - 204-010-740

Hydraulic Reservoir Assy - 204-076-004

Modular Assy - HRM No. 88700

Hydraulic Pump - 204-076-006

Cylinder Assy - 204-076-003

Cylinder Assy - 204-076-053

Tail Skid Instl - 204-030-947

Starter-Generator - 204-060-200 except air shrouds

Filter - 204-040-760

Valve, Drain - 204-076-013

Valve, Check - 204-076-437-1

Valve, Check - 204-076-437-3

Gauge, Air - 204-076-438-1

Valve, Solenoid - 204-076-439

Tail Rotor Blade 204-011-702-17

APPENDIX III-A (Continued)

All components of the main rotor hub assembly shall be common to 540-011-101 with the exception of the pitch horn.

The basic main transmission shall be common and adaptable on all UH-1C and UH-1D/H helicopters by removal or installation of external plumbing, mast assembly, and fan and generator quills as required for each application.

APPENDIX III-B

COMMON TOOLS TO THE MODEL

AH-1G AND UH-1C HELICOPTER

Ground Handling Wheels - 204-050-200
Sling-Main Rotor Lifting - T100220
Screw Set - T100929
Wrench Assembly, External Spline - T101306
Wrench Assembly, Curvic Coupling - T101307
Screw Set - T101308
Screw Set - T101338
Bench, Buildup - T101356
Wrench, Adapter - T101358
Scope Assembly - T101360
Support, Scope Adjusting - T101400
Scope Adjusting - T101401
Wrench, Bolt - T101414
Tool, Alignment - T101419
Fixture, Holding - T101420
Jack, Leveling - T101440
Grip Lock - T101466
Scope Mount - T101467
Flap Stop - T101468
Bearing Tool - T101475
Tab Bending Gage - T101485
Trim Tab Bender - T101486
Brg. and Seal Tool - T101487
Puller - T101491
Kit, Propeller Balancing - 7A050
Kit, Balancing - 7HEL054

APPENDIX III-B (Continued)

Kit, Adapter - 7HEL061
Kit, Small Part Balancer - 7HEL153
Kit, Adapter - 7HEL066
Engine Stand Basic T-53 - SWE-13855
Adapter, Transmission - SWE-13852-40
Engine Sling - LTC-T384

APPENDIX IV
ECP/VECP LISTING AND EFFECTIVITY

The following ECP/VECP's are included in the helicopter configuration described by this detail specification.

ECP No.	Date	Title	Effectivity	Authority
UH-1B/E/ AH-1G-294	16 Jun 66 (TWX)	Hub Deflector 540 Rotor	All	Basic Contract
UH-1B/D AH-1G-301	14 Jul 66	Universal Transmission	All	Basic Contract
UH-1B/C/D/E/F AH-1G-304R	28 Jul 66 Revised 23 Jan 67	Improved Input Driveshaft	All	Basic Contract
UH-1B/D/E/F AH-1G-306	4 Aug 66 (TWX)	Tail Rotor Yoke Nut	All	Basic Contract
UH-1A/B/D/E/F AH-1G-310	16 Sep 66	Improved Method for Connecting Engine Fuel Inlet Hose	All	Basic Contract
UH-1B/C/D/E/F/ TH-1F/AH-1G-328	18 May 67	Improved Components for UH-1 and AH-1G Series Transmissions	All	Basic Contract
UH-1A/B/C/D/E/ F/TH-1F,AH-1G-338	28 Jun 67	Improved Tail Rotor Hub Assy	All	Basic Contract
AH-1G-342	17 Nov 67	Provide Separate Intervalometer Control for Inboard and Outboard Rocket Pads	All	Basic Contract
AH-1G-343	17 Nov 67	Trigger Guard for Armament Firing Trigger Located in Pilot's and Copilot's Cyclic Stick Grip	All	Basic Contract

APPENDIX IV (Continued)

ECP No.	Date	Title	Effectivity	Authority
AH-1G-354	29 Sep 67	Shorten Hydraulic Hose, No. 2 System Collective Actuator	All	Basic Contract
AH-1G-355	21 Nov 67	Change Natural Frequency of Tube Actuator Installation	All	Basic Contract
AH-1G-356	21 Nov 67	Reinforced Skid Tubes	All	Basic Contract
AH-1G-358	22 Nov 67	Reinforced Plate for Transmission	All	Basic Contract
AH-1G-359	13 Mar 68	Improved Wire Drive in the Hydraulic Servo Cylinder	All	Basic Contract
AH-1G-363	27 Nov 67	Improved Tail Light Configuration	All	Basic Contract
AH-1G-366	4 Dec 67	Improved Attitude Indicating System	All	Basic Contract
AH-1G-367	16 Nov 67	Structurally Improved Lift Link Attachment Fitting	All	Basic Contract
UH-1A/B/C/D/E/F/H/TH-1F/AH-1G-371R2	12 Sep 68	Improved Hydraulic Oil Filtering System	All	Basic Contract
AH-1G-376R-1	12 Jun 68	Improved Pitch Link Tube Assembly	All	Basic Contract
UH-1C/E/AH-1G-378	10 Jan 68	Improved Hydraulic System Lockout Valves	All	Basic Contract

APPENDIX IV (Continued)

ECP No.	Date	Title	Effectivity	Authority
AH-1G-380	16 Jan 68	Increased Capacity Main Rotary Inverter	All	Basic Contract
AH-1G-388R1	26 Jan 68	Bleed Air Driven Oil Cooler Fan	All	Basic Contract
AH-1G-390	9 Feb 68	Relocate UHF-VHF and FM Antennas	All	Basic Contract
UH-1B/C/D/E/F/H/TH-1F/AH-1G-392	15 Feb 68	Improved Transmission #2 Oil Jet Housing	All	Basic Contract
AH-1G-398	8 Mar 68	Improved SAS Pylon Compensation Network	All	Basic Contract
AH-1G-400	15 Mar 68	Structurally Improved Mast Assembly	All	Basic Contract
AH-1G-408	25 Apr 68	Overload Protection for XM-28 Weapon System	All	Basic Contract
AH-1G-410	30 Apr 68	Reduced Cost Tailboom Access Door	All	Basic Contract
UH-1B/C/D/E/F/H/TH-1F/AH-1G-422R1	25 Oct 68	Improved RPM Limit Detector	All	Basic Contract
AH-1G-428	8 Aug 68	New Homing Antenna	All	Basic Contract
AH-1G-429	25 Oct 68	Provision for Increased Capacity Smoke Grenade Dispensing Unit	All	Basic Contract
UH-1H/AH-1G-431	29 Aug 68	VECP: Remove Manual Tailboom Handling Provisions	All	Basic Contract

7872 57824

APPENDIX IV (Continued)

ECP No.	Date	Title	Effectivity	Authority
AH-1G-432	25 Oct 68	Environmental Control System	All	Basic Contract
AH-1G-435	23 Sep 68	Increased Capacity Smoke Grenade Dispensing Unit	All	Basic Contract
UH-1H/AH-1G-439	2 Oct 68	Bleed Air Line Installation for Improved GFAE Particle Separator	All	Basic Contract
UH-1B/C/E/F/L /AH-1G/TH-1F /L-446	6 Jan 69	Improved Oil Line Configuration	All	Basic Contract
UH-1C/E/UH/TH-1L, HH-1K, AH-1G/J-450	22 Jan 69	Improved Main Rotor Blades	All	Basic Contract
UH-1C/E/L/M, TH-1L, HH-1K, AH-1G/J-481	15 Oct 69	Improved Tip Cap on Model 540 Main Rotor Blade	All	Basic Contract
UH-1D/H, AH-1G 482R1	19 Jun 70	Engine Fire Detection System	All	Basic Contract
AH-1G-508	3 Mar 70	Provide Shock Mounted Instrument Panels	All	Basic Contract
AH-1G-513R1	10 Jun 70	Provide MD736A Discrete Signal Discriminator	All	Basic Contract

APPENDIX V

INDEX OF REVISED PAGES

Page No.	Paragraph No.	Rev. No.	Date	ECP	Authorization	Description